The United States MILLER

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(Compiled for the UNITED STATES MILLER.)

ON WATER-WHEELS, ANCIENT AND MODERN.

The water-wheels first used to drive corn-mills were horizontal; they were of small size, and revolved rapidly. The axle passed through the centre of the lower millstone, as the spindle does now. It turned the upper millstone by means of a cross-bar fixed in the eye or centre of the stone, whilst a current of water directed against the vanes of the wheel on one side of the axle, urged it round. Such water-mills are still used in India. A modern traveller informs us that "all the flour-mills upon the river Meles at Smyrna are constructed in this way, and necessarily answer well in countries where water power is abundant, their great simplicity preventing their readily getting out of repair, while costing but little also." Some of these simple mills may yet be found in remote parts of Italy and France.

The horizontal water-wheel is again coming into notice with many refinements and improvements of modern invention; and not far from the rude Indian model before mentioned might be seen the elaborate machine of Messrs. Fromont & Son, French engineers, made entirely of iron, capable of working to fifty horse-power, with a fall of two metres, or six feet seven inches, and susceptible of such nice adjustment, as to be adapted to spin cotton and silk as well as to grind corn: while the inventor states, from his experience of similar wheels already in action, that he can obtain more than 70 per cent. of the power expended, and that, in one instance, the effective power has reached 79 per cent.

The Romans also used conical mills for grinding corn. A very complete example of this kind was found in the excavations of Pompeii, where it had been buried for nearly seventeen centuries. The locality appeared to have been the shop of a wealthy baker; and the mill, which was of considerable size, was so fitted as to be worked by men or cattle.

The vertical water-wheel appears to have been known to the ancients at a very early period, but it was chiefly used to raise water for the purposes of irrigation. Examples of such wheels, in their original form and use, are still to be seen on the Nile and the Euphrates; and wheels are also employed by the Chinese to raise water for their rice fields and cane plantations; those of Egypt and Syria generally resemble each other. The water wheel used in China unites with the simplicity of all Chinese mechanism great ingenuity of construction and adaption. The only materials employed in the construction of this water-wheel, except the axle and the two posts on which it rests, are afforded by the bamboo. The rims, the spokes, the ladle boards or floats, the tubes or buckets, are made of entire lengths, or large pieces, or thin slices, or single joints, of bamboo; neither nails, pins, nor screws, nor any kind of metal, are used; the parts are firmly bound together by cordage of split bomboo or cane. These wheels are from twenty to forty feet in diameter, according to the height of the land on the river's bank and the consequent elevation to which the water must be raised. A wheel of thirty feet carries twenty tubes or buckets about four feet long and two inches inside diameter, each of them holding six-tenths of a gallon, or twelve gallons in the whole. With a stream of moderate velocity the wheel will make four revolutions in a minute, and lift forty-eight gallons of water, or 2,880 gallons in an hour.

The primitive application of water-power to turn mill-stones has been noticed above, and the employment of horizontal water-wheels, with vertical axles, is still considered by French engineers to be in many cases advantageous, as presenting great simplicity and economy, both in construction, maintenance, and application; as requiring but little space, and in being able to work in floods and in frosty weather. In driving corn-mills they need no toothed-wheel work, and in besieged towns they can be worked at all times without interfering with the defences, being either placed altogether out of harm's way, or costing but little to shelter them from the enemy's fire.

Such is the opinion of experienced officers of the French artillery, who have made an elaborate series of experiments, and given an excellent report on the useful effect of the ordinary horizontal water-wheel at present used in France. Those on which the experiments were made are at Toulouse, where the two dams (barrages) of the Garonne, and the abundance of water in the canal of the south, near its discharge into that river, have rendered disposable falls of water sufficient to put in motion a great number of corn-mills by means of horizontal water-wheels. These wheels are of two kinds: those situate on the rivers are called bucket-wheels (*a cuve,*) and are similar to what are used at Cahors, at Metz and other places; those which are placed on the canals are called whirl-wheels (*roues volants,*) and much resemble those which have existed from time immemorial, and are turned by the percussion of the water upon curved floats, which are here used instead of the ladles that are fixed round the axles of the mills of the Alps.

It may be remarked that in Northern Africa several rude mills are to be found in the same fashion as they have existed for ages, among a people the least advanced in the arts of industy; many of them are on the great falls of the Rummel, at Constantineh, and instead of ladles these have pieces of wood rudely driven into the upright axle, like spokes into the nave of a cart-wheel. A channel being made from the river, at an inclination of 30 or 40 degrees, the water is directed against the side of the wheel, and having done its work, it is returned to the river and employed again and again as it descends the hill to turn a series of such mills. In some of these the upper end of the vertical axle is fitted with a bent arm or crank, and the millstone, which, in such cases, is fixed in an inclined position of 10 or 15 degrees to the horizon, is forced round by it. With these mills they prepare the coarse meal, which, being cooked in steam, makes the couscouson, the common food of the natives.

The localities at Toulouse afforded many favorable circumstances for making experiments, besides the general employment of these two kinds of wheel, so that the results of both could be readily and exactly compared by the same dynamometers and other instruments used by the same observers.

The result of all the trials appear to be that on the horizontal water-wheels with buckets, the effects produced at ordinary speeds varied from 15 to 27 per cent. of the power employed when the mills and wheels were in good condition. The speeds were varied from 60 to 135 revolutions per minute; but the best effect seems to have been obtained at about 90 revolutions, with a total fall of water, measuring the difference of level above and below the wheel of from seven to eight feet. The wheels were about five and a half feet in diameter; that of the millstones is not stated in the report, but they appear to have been such as are in general use—probably about four and a half feet. The water which drove these wheels was discharged through an ordinary sluice, and passing through a channel of stone-work, was thrown obliquely on the wheel. The other kind of horizontal wheels experimented upon was distinguished by the name of "*roues volants*", here termed a *whirl-wheel*—for the term fly-wheel, as we now use it, is applied to a very different piece of machinery, namely the massy cast-iron regulator of steam-engines and other heavy works.

These wheels received the water directed upon them through an inclined pyramidal trunk of wood upon one side of the wheel; the larger end of the trunk being closed, or the entrance of the water regulated by a sluice, against which was a head of water of fourteen or fifteen feet; to which the inclination of the trunk, or about two feet more, may be added, so that the ladles af the wheel where acted upon by the weight and impulse of the water, and were so formed as to continue such action until the water escaped between them, and passed through the wheel. When these wheels made 102 and 108 revolutions per minute, the useful effect was from 29 to 33 per cent., and when the resistance of the work done reduced their speed to 90 and 85 turns per minute, their effect reached to 39 and 40 per cent. of the power expended, the useful effect of these wheels being nearly the same as that of the old undershot water-wheel.

The difference in construction between the two kinds of mills appears to be very slight, and their dimensions and cost to be the same, or nearly so; but the supply of water being abundant, the millers paid no attention to the quality expended in performing a given amount of work. The wheels are made of cast iron, and the pivot of the upright shaft stands upon a foot-bridge or lever, fixed at one end, and regulated at the other end by a second lever place in the mill above, so that the millstones may be adjusted to grind closer or otherwise in the usual way.

It is, however, well known to all millwrights that a much greater amount of useful effect is obtained when water acts by its impulse; and it has been found expedient in some places where the millers desired to retain the horizontal wheel and to economize the expenditure of water, to vary its construction, so that the weight of the water should act, and that without impulse. This has been effected by using, as it were, two wheels, one laid upon the other; the upper wheel being fixed and immovable, and serving only to direct the water against the vanes or buckets of the lower wheel, which is forced round by the pressure so directed against it. This mill is known in Germany and France as Koechlin's turbine. A cylinder is formed of cast iron, wrought iron plates, or wood strongly hooped, and is made open at the top, unless the millstone rest upon when the power is used to grind corn. The upper end of the cylinder is somewhat higher than the head of the column of water intended to act upon the wheel, the water entering it through an opening on one side, and the internal diameter as proportioned to the quantity of water to be used, there is a sluice to regulate the supply at top, fixed in the pentrough, and another at the bottom which regulates the expenditure; the pressure of the atmosphere on the top is supposed to render the whole column effective. The first wheel forms a bottom to the upper portion of the cylinder, which must be firmly secured to a foundation of masonry or timber. The upright shaft or axle is fitted into the moving wheel and turns with it, passing through a collar properly bored and lined with brass, in the centre of the upper or fixed wheel; it is steadied and secured by another collar formed on a frame or bracket, screwed to the top of the cylinder, which may be dispensed with if the nether millstone be used instead. The pressure of the water is directed by the vanes or guide-curves of the upper wheel into the buckets of the lower one, so as to bear upon them with the greatest effect, while by the regulation of the two sluices the cylinder is kept full, and the descending column of water passes like an eddy through the wheels with a force proportioned to the whole height, for the lower end of the cylinder is immersed in the water, which in ordinary times just covers the outlet opening, and in flood times rises above it, so that the power due to the difference between the surfaces of the dam and the tail of water may always be available.

The primitive form and use of vertical wheels for raising water for the irrigation of land in China and the Orient, has been already noticed. These, simply dipping their float into a river, were turned by the current with such velocity and force as the stream might impart to them. Yet, before quitting this part of the subject, it may be proper to mention two modes of applying these wheels, which have been practiced in America.

One of them was to place a strong axle across a boat, or some other vessel, of large dimensions, with a water-wheel at each end of this axle, like the paddle-wheels of a steamboat; and this vessel being moored in a current, the wheels revolved and gave motion to mill-stones and machinery for grinding and dressing flour on board the floating mill. The other was by means of a similar axle and a pair of wheels, thus mounted in a boat, to cause the boat so fitted to warp itself, and to tow other boats up a rapid by winding one end of a rope round the axle, the other end being made fast to an anchor, or other mooring above the rapid. This means of ascending rapids in our rivers has been generally superseded by the employment of powerful steamboats, but it is worthy of being recorded as an ingenious contrivance to derive from the existing medium itself a power to overcome it by duly proportioning the diameters of the wheels and axles.

The next improvement was an important one, and it rendered the vertical water-wheel a powerful mechanical agent.

By penning back the stream with a dam or barrier thrown across its channel, so as to accumulate and raise the water to a head; and by cutting a canal, or water-course, in the bank, communicating with the reservoir so formed, and re-entering the river by its side at a lower level; by erecting the wheel in this water-course, and by interposing a sluice between the wheel and the pent-up water, so as to stop or regulate its efflux, the whole power of the water heretofore spread over the bed of the river might be concentrated against the wheel, rushing through the opening of the sluice with a velocity and impulse due to its head and volume, and acting upon the float-boards with an amount of force and effect which could not be obtained in the open river; the water being now confined between walls of solid masonry, almost in contact with the wheel, and within which it revolved. These walls also served to support the axis of the wheel and to retain the sluice, while a pavement of heavy stones below, between the walls, prevented the water from escaping beneath the wheel until it had done its duty. When the sluice was shut down and the wheel stood still until the dam was filled to overflowing, the water passed over the barriers and rolled on as before, through its old channel in the river, or was discharged into it through a waste-water sluice, sometimes made self-acting by means of a balanced float or some similar contrivance; and, on adopting such apparatus, great ingenuity has often been displayed, especially in the Shaw's Waterworks, as well as by some of the French engineers. Arrangements like these, so simple, so effective and so easily made and managed, rendered the undershot wheel most useful and valuable as a means of obtaining mechanical power sufficient to drive extensive flour-mills, fulling-mills and forges, for which purposes it was, in the first instance, chiefly used to aid an agricultural population in more readily supplying themselves with bread, woolen cloth and iron—the principal requirements of a primitive community, with whom spinning and weaving were as yet domestic em-

ployments. From the numerous experiments made of John Smeaton, the most experienced and eminent engineer of his time, we deduce the following rules, or, as he calls them, maxims:—

"1. That the virtual, or effective head, being the same, the effect will be nearly as the quantity of water expended.

"2. That the expense of water being the same, the effect will be nearly as the height of the virtual or effective head.

"3. That the quantity of water expended being the same, the effect is nearly as the square of its velocity.

"4. The aperture being the same, the effect will be nearly as the cube of the velocity of the water."

It was not difficult to imagine that if a small stream of water descending from a hill-side, were directed into the mouths of the earthen vessels or wooden buckets of the wheels used for irrigation, the vessels so loaded would descend and the wheels revolve, so that rotary motion and mechanical power would be gained; the buckets emptying themselves at the lowest point, as they had before been emptied at the highest; the wheel turning in the opposite direction, because the weight or gravity of the water was now the moving power of this overshot wheel. In the undershot wheel the impulse of the water striking the floats drives the wheels; in the overshot wheel the weight of the water flowing into the buckets turns the wheel, and all impulse must be avoided; the water must flow with the same velocity as the wheel, or just so much in excess as will prevent the buckets from striking the water as they present themselves to be filled. Experience soon showed that the earthen jar or the suspended bucket were cumbrous and inconvenient, and as larger and more powerful wheels were applied to more copious streams, a series of simple wooden troughs formed across the face of the wheel were found to answer the purpose better. When the supply of water was ample and the wheels large, it was found that to fill these troughs well and regularly the stream should be made nearly as broad as the wheel, and shallow in proportion to its width. The wheel was then formed by placing two sets of *arms*, at a sufficient distance apart, upon the *axle*, and fixing to their ends *segments* of wood to form the circle; upon these segments across *the face* of the wheel, and equal to or somewhat exceeding in length the width of the stream or sheet of water, were nailed the *sole-boards;* on the end of these boards, and at right angles to them, so as to form a projecting rim or ledge on each side of the wheel's face, was fixed the *shrouding*, formed of stout plank generally from 12 to 18 inches broad; and between these shroudings, across the face of the wheel, were placed the *buckets*, made of lighter planking, and having their ends let into the shrouding, by which the ends were closed. The edge of the bucket-board meeting the sole-plank formed two sides of a triangular trough, the third being open to receive the discharge of water. Subsequently the bucket was made in two boards, one called the front and the other the bottom of the bucket, the latter taking off the angle and making the section of the bucket or form of the trough, that of a trapezium, which form it long retained, until the buckets of water wheels were made of iron-plate.

Since water-wheels have been made wholly of iron, and chiefly of wrought-iron, the form of the bucket has been either a part of a circle, a cycloid, an epicycloid, or an Archimedian spiral. Great pains are now taken by the best makers of water-wheels to form and adapt the curve of the buckets so that they may readily fill with water, retain their load as long as possible, and discharge it with facility when it has ceased to be useful.

LETTER FROM THE JOHN T. NOYE M'FG CO.

BUFFALO, N. Y., Aug. 28, 1883.

Editor United States Miller:

So many of our valued patrons have, of late, protested against the making public their private business matters, in the way of announcing the purchases they have made, and the once virtuous practice having fallen into such manifest misuse, we have determined from and after this date to discontinue the practice of furnishing you in such wholesale quantities for publication, what is known as trade notes. We confidently believe the time employed in preparing, and the space occupied in your journal in publishing them, could and should be devoted to purposes of greater benefit to your numerous readers. Yours truly,

THE JOHN T. NOYE M'FG CO.

UNITED STATES MILLER.

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FLOUR MILL OWNERS—Please send us your address, with capacity of your mill in barrels per day of 24 hours, and also state whether you use steam or water-power, or both.

ONE of our Milwaukee mills, the State Mills, was badly damaged by fire Saturday, Sept. 1. The insurance on the property is $55,000, and the damage is fully that amount. As soon as the damage is adjusted, the Company will rebuild, and in 60 days will have everything in order again..

THE COMPOSITION OF AMERICAN WHEAT AND CORN.*

(By Prof. CLIFFORD RICHARDSON, of Washington, D. C.)

Under my direction, during the last 10 years, more than 200 analyses of wheat and 100 of corn were made. Most of the wheat samples were of winter varieties from all portions of the continent, and as they were especially selected, it is probable the average is high, although some were remarkably poor, and show the extreme in that direction. The averages are all of American wheats. All of the American analyses have been made in the same laboratory (that of the chemical department, Washington) and by the same hands, and are therefore reliable.

THE FOLLOWING AVERAGES.

have been calculated.

Average composition of American wheat from all known analyses of samples grown in America. Average:

Composition of the same, omitting those analyses which are incomplete from non-deterioration of oil and fibre.

Average composition of American wheats, excluding the exceptionally rich wheats of Colorado and averages of the composition of wheat by states. For comparison several averages from foreign authorities.

It is apparent that while our wheats are but a trifle lighter in weight per 100 grains that the foreign wheats they contain less water, about the same ash, more oil, less fibre and less albumen.

The following is a table for the limit of variations:

	Lowest	Highest.	Variation.
Water	6.05	12.52	6.47
Ash	80	2.98	2.18
Oil	1.39	3 93	2 54
Starch, etc	67.94	78.94	11.00
Fibre	.44	2.76	2.32
Albumen	8.05	7.15	9.05

THE ALBUMINOIDS

are considered the most valuable portion of the wheat, and hence receive the most attention. The extremes, however, in this direction are not nearly so large in this country as have been found in other countries. It is probably not owing to any inherent characteristics of the wheats themselves, that less water is found in the American than in foreign wheats, but it is probably more dependent on the condition of gathering, preserving and grinding for analysis. In the ash the averages are alike, except in Colorado, where the new and rich soil has greatly increased it, and it is concluded that an ample supply of mineral food also increases the ash. The fibre is decidedly smaller in our wheats, as was found to be the case in our grasses when compared with those of foreign growth, the grasses, like the wheats, containing much less albumen than continental varieties. It seems, then, that a decrease in albumen is followed by a decrease in fibre. Among our own wheats only, those from Colorado, but perhaps Dakota and Minnesota, can equal in albuminoids and size of grain the European varieties.

THE WHEATS OF THE ATLANTIC STATES

are on the average much the poorest in nitrogen and albumen, and smallest in size. Those from New York and Vermont are large in size but not equal to the best in nitrogen, although cultivated to a high condition. The Virginia wheats have an extremely small weight and rather more nitrogen. Those of Maryland appear to be the best among them, and command three or four cents per bushel more than those from other sources.

Samples of wheat from all over the world give the following results of the average percentage of nitrogen albumen in wheats of the world:

COUNTRIES.	Per cent. of Nitrogen	Per cent. of Albumen	Highest Albumen	Lowest Albumen	Weight of 100 Kernels
Russia	3.12	19.48	24.56	10.68	.....
Russia	2.34	14.63	16.56	14.24	3.610
N. Germany	2.24	14.00	18.2.	9.80	4.498
S. Germany	2.17	13.56	17.76	10.21	4.485
Germany	2 11	13.19	.....	....	.....
Germany	2.08	13.09	.....	.....	.....
Spain	2.10	13.13	15.29	11.26	4.270
France	2.08	13.00	....	.....	.....
Scotland	2 01	12.56	....	.....	4.680
Australia	1.60	10.00	.....	.....	.....
Egypt	1.47	9.19	9.92	8 75	5.540
America	1.92	12.00	17.15	8.05	.....
Amer. Excl. Col.	1.86	11.62	16.63	8.05	(3.532)
Colorado, 1881	2.14	13.40	15 94	11.19	4.833
Colorado, 1882	2.09	13.06	14.88	11.55	4 299
Minnesota	2.05	12.79	17.15	10.85	3.354
Michigan	1.92	12.00	14.47	9 13	(4.116)
Missouri	1.88	11.44	12.44	10.60	3.502
Oregon	1.46	9.17	10.63	8.05	4.800
Atlantic States	1.79	11.18	14.00	8.93	3.057
Pennsylvania	1.80	11.25	12.78	9.45	3.211
N. Carolina	1.67	10.46	12 43	8 93	3.782
Alabama	1.82	11.32	13.65	9.80	3.187

IN THE MIDDLE WEST,

Kentucky, Tennessee and Missouri wheat is produced which is much larger in size, and while slightly better than the Atlantic States, yet poor in quality. In Colorado, Minnesota and Dakota we first reach a wheat equal in nitrogen and albuminoids as we should desire. In Oregon, while the size is of the best, the quality of the albuminoids falls to the lowest point. It is a strange and as yet unexplained fact that while the wheat in Oregon and Colorado is almost equal in quantity of yield and size of kernel, yet there is a wide difference in composition. They vary in albuminoids thus: Colorado, 14.18; Oregon, 10.63. Climate and condition must be largely the cause. As an illustration the following analyses serve:

WHEAT FROM—	Va.	Col.	Ore.
Wheat of 100 grains	1.880	4.789	4 258
Yield per acre	7 bu	Large	Large
Water	6 45	10 17	7.80
Ash	2.45	2.02	1.75
Oil	2.18	2.13	2.31
Starch, Sugar, etc	78.02	70.10	77.68
Fibre	1.00	1.40	1.88
Albuminoids	14.	14.18	8.58

It was found that by cultivation and increase in fertility the wheat increased its fibre and also the ash by the addition of mineral matter, and it was clearly evident that cultivation had a powerful effect. Several experiments were cited to prove this. Out of 44 wheats from Colorado that were analyzed during 1881 and 1882, only one fell below 11.50 in the albumen contained, and only six below 12. In North Carolina, among 21 varieties, only two exceeded 12 per cent. It has been claimed that latitude made the difference in quality of wheat, but soil has been shown by experiment to be the main factor. From a farm in Maryland it was found that the fallow land produced a grain richer in nitrogen and of about the same size as the corn ground; but as observed the fallow crop was much larger. The analysis of corn shows that the average albumen in dry flint corn is 11.62, while in dry Dents it is 11.32. The northern flints thus present a trifling advantage over southern Dents. Corn is not so exhausting a crop as wheat, as it draws its nitrogen more from outside and deeper sources, and from its long season will succeed where a wheat crop fails. Corn contains, compared with wheat, more water, twice as much oil, less starch, rather more fibre and less albuminoids. The average amount of albumen in our cereals is as follows:

Wheat 14 8; barley, 14 8; oats, 13 8 9; rye, 13 9-25; corn 10.

* This article was read at a Session of the Social Science Congress at Minneapolis, during Aug, 1883. The author, Prof. Clifford, is first assistant Chemist of the Agricultural Department of the ited States.

A GRAPHIC DESCRIPTION OF THE BESSEMER AND BASIC PROCESS IN THE MAKING OF STEEL.

The following concise and comprehensive description of the making of steel under the Basic process, is from Andrew Carnegie's, new work entitled: "An American Four in Hand in England". Its perusal will impart much information not previously possessed; Mr. Carnegie writes:

"We were honored while here by the presence of Mr. Sidney G. Thomas and his sister, who came down from London and spent the day with us. Mr. Thomas is the young chemist, who, in conjunction with his cousin, Mr. Gilchrist, would not accept the dictum of the authorities that phosphorus, that fiend of steel manufacturers, cannot be expelled from iron ores at a high temperature. They set to work over a small toy-pot, which deserves to rank with Watt's tea-kettle, to see whether the scientific world had not blundered.

"Let me premise that the presence of phosphorus in pig iron to the extent of more than about one tenth of one per cent., is fatal to the production of good steel by the Bessemer, or open-hearth process. Do what you will, this troublesome substance persists in remaining with the iron. If there be phosphorus in the iron-stone you smelt, every atom of it will be found in the resulting iron; and if there be any in the lime-stone, or the coke or coal used, every atom of it also will find its way into the iron.

"It is essential, therefore, that iron-stone should be found practically free from phosphorous; but unfortunately such ore is scarce, and therefore expensive. The great iron-stone deposits of England, are full of the enemy; so are those of America; hence, both countries depend largely upon ores, which have to be transported from Spain and other countries. One authority estimates that, if all the high phosphorous ores in Britain could be made as valuable as those free from the objectionable ingredient, the saving per annum would go far to pay the interest upon the National Debt. Many have been the attempts to devise some tempting bait to coax this fiend to forego his strange affinity for iron, and unite with some other element; but no, his satanic majesty would cling to the metal.

Messrs. Thomas & Gilchrist, in studying some highly creditable experiments, made by my friend Lothian Bell, Esq., (for he was upon the right track), discovered an oversight, which seemed to qualify the results, which he reached, and to render his experiments inconclusive. It was possible, they thought, that his failure might have resulted from the fiend not being *kept* out when he was out; so they went quietly to work with their toy-pot, and Eureka! Their charm had not only exorcised the fiend, but they had discovered how to lead him away from the molten metal into the refuse and shut the door on him there. Here was a triumph indeed! I fancy they neither ate, nor slept till repeated experiments proved that the true charm had been found at last.

"Mr. E. Windsor Richards, the broad manager of the largest manufactory of iron and steel in the world, was soon acquainted by them with the discovery. He tried it upon a large scale, and announced the end of the reign of King Phosphorus; but he dies hard. This was some years ago; but I read the good news a few minutes after I had landed at Naples from the East, on my way round the world in the year 1879. Many obstacles had yet to be surmounted, but now every ton of steel manufactured at Mr. Richard's great works is made from iron-stone, which a few years ago was counted worthless for steel. Enough iron-stone can be had for three dollars to make a ton of pig iron suitable for steel rails. The same amount of low phosphorus stone at Pittsburgh cost last year sixteen dollars, and yet there are intelligent people who do not understand why we cannot make rails as cheap as the English.

"I wonder if I could explain to the general reader how Messrs. Thomas & Gilchrist succeeded. It always seems to me like a fairy tale—I will try. In making steel, ten tons of molten pig iron is run into a big pot called a converter, and hundreds of jets of air are blown up through the mass to burn out the silica and carbon, and finally to make it steel. Now, phosphorus has a greater affinity for lime than for iron when it reaches a certain temperature, and when the air blast brings the mass to the required heat, the million particles of phosphorous, like so many tiny ants disturbed, run hither and thither, quite ready to leave the iron for the lime. These clever young men first put a lot of lime in the bottom of the pot as a bait, and into this fly the ants, perfectly delighted with their new home. The lime and slag float to the top and are drawn off—but mark you, let the temperature fall and the new home gets too cold to suit these salamanders, although the temperature may be over 2,000 degrees, hot enough to melt a bar of steel in a moment if thrown into the pot. No, they must have 2,500 degrees in the lime or they will rush back to the metal.

"But here lay a difficulty: 2,500 degrees is so very hot that no ordinary pot lining will stand it, and of course the iron pot itself will not last a moment. If ganister or fire-brick is used it just crumbles away, and besides this, the plaquey particles of phosphorus will rush into it and tear it to pieces. The great point is to get a basic lining—that is, one free from silica. This has at last been accomplished, and now the *basic process* is destined to revolutionize the manufacture of steel, for out of the poorest ores, and even out of puddle-cinder, steel or iron much purer than any now made for rails or bridges can be obtained, and the two young chemists, patentees of the Thomas-Gilchrist process, take their rank in the domain of metallurgy with Cort, Nelson, Bessemer and Siemens. These young men have done more for England's greatness than all her kings and queens and aristocracy put together.

"It was this pale Gladstonian-looking youth we had with us for the day and for our Sunday evening dinner at Windsor. He wears no title—he is too sound a Radical and too sensible a man to change the name his honored father gave him—but nevertheless we felt we had one of the great men of our generation as our guest. If it be true, as it is, that he who causes two blades of grass to grow where but one grew before is a benefactor to his race, what is the magician who takes from the bowels of the earth a ton of dross and transforms it into steel before our eyes—strikes with his enchanted wand a hundred mines of worthless stone and turns it into gold, as the Prophet struck the dry rock and called water forth? The age of real miracles is not over, you see, it has only begun, and Thomas is our modern Moses; his miracle seems as much greater than that of his prototype as the nineteenth century is advanced beyond the Jewish dispensation."

THE THEORY OF CHIMNEY DRAUGHT.

The upward movement of warm air and gases of combustion in chimneys is caused by the difference in density of the external air and of the enclosed gases. All permanent gases expand 0,0020284 (or $\frac{1}{493}$ of their volume for each degree Fahr. difference in temperature, and the density in weight per unit of volume decreases as the volume increases—that is, if the volume is doubled the weight per unit of volume will be only one-half of the original weight. Suppose a parallel tube to be of one square foot of cross section and 100 feet high, filled with air of the same density and temperature as that surrounding it, the air pressure will then be in equilibrium inside and outside of the tube, namely, 14·7 pounds to the square inch, or 2116·8 pounds to the square foot which is the pressure at the base. All gases exert pressure equally in all directions, so that the downward pressure of the air at the bottom of the tube is balanced by the upward pressure of the surrounding air, consequently no motion will ensue. The weight of a cubic foot of dry air at 60° Fahr. is 582 grains; or the air in the tube (100 cubic feet) would weigh 53·200 grains, or 7·6 pounds—that is to say, the pressure per square foot at the top of the tube would be only 2116·8—7·6= 2109·2 pounds, the force with which the enclosed air presses upwards at the top, and is balanced by the pressure of the air above, so that no motion will ensue. Now let us heat the air in the tube from 60° to say 360° Fahr., a difference in temperature of 300°. The enclosed volume of air will be expanded to

$$1 + 300 \times 0{\cdot}0020284 = 1{\cdot}60852 \text{ volumes.}$$

The actual volume in the tube is 100 cubic feet expanded to 160·852—that is 60·852 cubic feet will be ejected from the tube by the force of expansion of the heated air, but the weight of the remaining 100 cubic feet of air in the tube will be only

$$\frac{7{\cdot}7}{1{\cdot}60852} = 4{\cdot}714 \text{ pounds}$$

or 7·6—4·714 = 2·886 pounds less than the upward pressure of the surrounding air at the base. The heated air in the tube will consequently be set in motion upwards by this motive force of 2·886 pounds by the cool air entering under the base. This is the principle upon which the so-called "draught" is generated in chimneys, which in reality is no draught, but a pushing of the cold air under the fire-grate, by expansion of the heated air, which drives the mixed gases of combustion up through the chimney. In our first illustration the cold air from underneath the tube will soon drive out the heated air and establish an equilibrium of pressure by which the upward motion is stopped. But in a furnace the enclosed air and other gases are continually heated, which results in a continual motion upwards in the chimney.

The intensity of draught is independent of the size, and depends upon the difference in weight of the outside and inside columns of air. The intensity or degree of heat produced by fuel varies in proportion to the rate at which it burns. The greater the draught a greater amount of work will be produced from the same fuel. This goes to show the importance of a high chimney.

The power of the draught is directly proportioned to the height of the chimney, and the velocity with which the external air flows in to supply the draught depends upon the temperature of the ascending gases. The higher the temperature is the lighter will the gases be, and consequently create a stronger draught through the grate-bars. This velocity is proportional to the square root of the height of the chimney. Air at 520° expands to double its volume at 32°. At this temperature, therefore, within the chimney, the velocity with which the external air will pass through the grate-bars would be proportional to the square root of half the height of the chimney, which, expressed in feet per second, is equal to eight times the square foot of half the height of the chimney, or

$$V = 8\sqrt{\frac{H}{2}}$$

Example.—The height of a chimney is H = 128ft., and the temperature of the gases T° = 520°. What will be the velocity of the air through the grate-bars?

$$V = 8\sqrt{\frac{128}{2}} = 64 \text{ ft. per second}$$

As a general rule for calculating the draught at any temperature the following is near enough for all practical purposes:—

$V = 8\sqrt{H\, a\, (T° - t°)}$ in which

H = the height of the chimney in feet.
V = velocity of the escaping gases in feet.
T° = the temperature of the warm air.
$t°$ = the temperature of the cold air.
a = the coefficient of expansion of air for one degree of the thermometer at 32° will be $\frac{1}{493}$ = 0.002028 under constant pressure.

The area of a chimney for ordinary purposes may be determined by the following formula:—

$$A = \frac{0.3\ HP + 10}{VH} \text{ or } \frac{G + 10}{VH}$$

HP = horse-power of boiler.
A = area of chimney in square feet, at the smallest part.
G = area of grate in square feet.

The constant 10 allows for the difference in friction between large and small chimneys. Height and area are the only elements necessary to consider in an ordinary chimney.

Unlike solids, gases expand equally for an equal increase of temperature, as measured by a thermometer. The experiments made by Rudberg, and confirmed by Regnault, show that atmospheric air, heated from the freezing to the boiling point, expands at the rate of $\frac{1}{493}$ or 0.0020234 fore ach degree Fah., being the increase of volume under constant pressure.

If we wish to ascertain the volume of $v = 200$ cubic inches of a gas at $t° = 60°$ would occuby at T° = 100 degrees, we must remember that it does not expand $\frac{1}{493}$ of its bulk, at 60° for each degree, but $\frac{1}{493}$ of its bulk at 32° and so on.

$$V = v\left(\frac{T°-t°}{493} + 1\right) \text{ and } T° - t° = \frac{493\ (V-1)}{V}$$

V and v = volume of dry air of temperature $t°$ and T°.

$$V = 200\left(\frac{100-60}{493} + 1\right)$$

THE TARIFF.

False Statements and False Prophecies by British Free Traders.

BY JOHN W. HINTON, OF MILWAUKEE.

[For the UNITED STATES MILLER.]

A recent number of a Chicago Free Trade organ contains an interview with the Earl of Onslow on Free Trade &c., with the following: "He is heartily in favor of free trade, like most of his countrymen, though he says there is some dissatisfaction with it in England, but it is confined to the agricultural classes, against whom the present system militates, because they cannot compete with American food products. As they are but a small portion of the British public, he does not look for any great change of sentiment on this question."

Accepting the report of the Earl's views as fairly given, I wish to point out the facts—the truth, as to "the great change of sentiment upon the question of free trade in England."

From an excellent work "Protection and Free Trade," recently published, I copy the following as clearly pertinent to the issue:

"Until recently Free Trade was regarded by most Englishmen as the worship of Brama is by the Hindoos, a matter of devout contemplation only—too sacred for discussion. But the fair trade movement has recently decided five important elections; and Mr. Ritchie's motion in March 1882, in the British House of Commons, which Free Traders turned into one of Fair Trade against Free Trade, was lost by only 51 votes, there being 140 against it, and 89 for it; a change of 26 votes would have carried it."

False statements are as common as false prophecies by free traders.

John Bright, at the Cobden celebration in 1877, prophesied thus:

"If we look into France we see that protection is becoming weaker. If we look at the United States or consult any intelligent American, we shall find that there it is shaken and tottering to its fall."

Ten years previous, to wit, in 1867, Mr. Bright wrote to the Chicago Tribune, and then prophesied:

"All the countries of Europe are tending to freedom of trade."

In one of his speeches in 1844, Richard Cobden said in reply to doubts as to the benefits to accrue to England from her adoption of free trade (?), and the dangers, if other nations became protectionists, passing tariffs for their own benefits, so much feared:

"You have no more reason to doubt that the sun will rise in the heavens to-morrow, than you have to doubt that in less than ten years from the time England inaugurates the glorious era of free trade every civilized community will be free-traders to the backbone."

And he also said:

"Adopt free trade and there will not be a tariff in Europe that will not be changed in less than five years, to follow your example."

Thirty-nine years have passed, and every one of them has shown how false have been both prophecies.

Thirty-nine years have gone by since Sir Robert Peel said:

"Depend upon it, your example will prevail. Reason and common sense will induce relaxation of high duties. I see symptoms of it already."

"Reason and common sense" have, since that time, enacted every tariff now in existence. As an irrefutable fact, we assert, that scarcely a single assertion, or prophecy, made by either Sir Robert Peel, Richard Cobden or John Bright, has ever been verified. Bread, it is true, has been made cheaper to the British operative. But there stares him in the face that cruel conclusion of British free traders, that "in order to give capital a fair remuneration the *price of labor must be kept down*".

"Foreign countries" have seen the fallacies and falsehoods of British free traders, and, hence, have passed tariff laws for their own protection, and as Mr. Beaufort Hurlbert says:

"When foreigners see manufacturers dying out under free trade in England, and springing into vigorous life under protection in France, Germany, Belgium, America and Canada. When they see the ruin of industry, the depression of all manufacturing interests, operatives emigrating, capitalists preferring investments in foreign countries to those of their own; they do not look much further for arguments against free trade."

Even Mr. Gladstone, a free trader said:

"Gentlemen, have compassion on me while a minister of the crown, and after that I will go with you strong on the *abstract* principle, although utterly impracticable in the affairs of terrestrial kingdoms. *I warn any terrestrial government against adopting free trade.*"

Other Englishmen, while in Chicago, gave different views. The Earl of Latham was asked:

"Are you a free trader?" He replied:

"No; I think personally that England has too much free trade. It is wrong that England should stand alone with free trade against the protectionist policy of the rest of the world. We are losing by it daily."

A Scotch Lord, Elphistone, said:

"If we all had free trade it would be very well. But inasmuch as we have tried for thirty-three years to bring about free trade by showing an example of it, and free trade has been most unsuccessful and made no converts, I think it is high time we should endeavor to pull down the prohibitory duties the United States and other countries are puting on our manfactured goods, and put on something in the way of retaliatory duties upon their products—excepting always our own colonies—so as to bring about a bond between England and the colonies that would make them more of a united empire than we have at present."

A member of the British Parliament from London, Lord Stovely Hill, was singularly emphatic, in his reply, saying:

"England has had the worst of it ever since she adopted the policy of free trade. Imports from other countries have been admitted free, while our exports to the United States and other places have been subjected to onerous duties, sometimes so high as to be actually prohibitory. There is a growing sentiment in England now in favor of taxing imported manufactured articles instead of admitting them free to compete with the products of our home manufacturers. Why, you can now buy a shawl at Glasgow, which is only a short distance from Paisley, the great shawl manufacturing place of the world, for less money than you can buy one at Paisley. Germany is actually exporting shawls to Scotland, and, these being admitted free of duty, the Germans can of course undersell us in our home products."

The truth is, no Englishmen are satisfied with the condition of England as brought about by free trade. *If*, momentuous word indeed, all other nations had adopted free trade, and fulfilled, instead of falsifying the prophesies of British free traders, and opened their markets to the influx of British goods, as was expected, and England had remained "the workshop of the world," English cupidity would have been satisfied. Nor would they now be found moving "heaven and earth," nor her Cobden Club be found "sending money wherever it may do good" to try and cause the repeal of the American Tariff.

We have Mr. Brigh'ts own testimony to the marvellous prosperity of this country; its wonderful wealth, the remarkable, though singular spectacle of a nation so rapidly paying off its war debt, as to excite the wonder and admiration of the leading free traders of the world; and to have elicited the remark from the present Premier of Britain that "America is passing us with a bound;" and this notwithstanding Mr. Gladstone was the first Englishman of note to say publicly in 1861, "Mr. Jefferson Davis has made a nation of the Southern States," a statement loudly cheered by the listening free traders.

Judging from the desperate efforts of English free traders and their American helpers in the press, the universities, colleges, and sometimes in our pulpits, we are forced to the conclusion that the American Protective Tariff is a national blessing to the people of the United States, and *per contra*, English Free Trade is a curse to England. No sensible nation, or people, or honest party, ever seek to change that which has proven beneficial—never!!

The truth of the whole matter is, "we are passing England with a bound." It is our successful honest rivalry, our marvellous progress and prosperity in manufacturing, etc., the well paid labor of the United States, tempting so many skilled mechanics of other countries to come here; our extensive export of manufactured goods into England and her colonies, where we undersell the English themselves, that excites the animosity, and causes the Cobden Club to redouble its efforts to accomplish what the *London Times* asserted and several of the leading members of the club avowed, "never to rest contented until they had subdued America."

The Marquis of Salisbury stated the whole of the case in a nutshell when he said: "The United States keeps an opposition shop in the same department as ourselves." That's all there is of it.

JOHN W. HINTON.

UNITED STATES MILLER.

E. HARRISON CAWKER, EDITOR.

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MILWAUKEE, SEPTEMBER, 1883.

We respectfully request our readers when they write to persons or firms advertising in this paper, to mention that their advertisement was seen in the UNITED STATES MILLER. *You will thereby oblige not only this paper, but the advertisers.*

Flour Mill Directory.

CAWKER'S AMERICAN FLOUR MILL DIRECTORY shows that there are in the United States 21,356 flour mills and in the Dominion of Canada 1,488. The mills in the United States are distributed as follows:

Alabama, 388; Arizona, 17; Arkansas, 234, California 209; Colorado, 52: Connecticut, 309; Dakota, 44; Delaware, 96; District of Columbia, 7; Florida, 81; Georgia, 514; Idaho, 18; Illinois, 1258; Indiana, 1163; Indian Territory, 8; Iowa, 872; Kansas, 437; Kentucky, 642; Louisiana, 41; Maine, 220; Maryland, 349; Massachusetts, 363; Michigan, 881; Minnesota, 472; Mississippi, 297; Missouri, 942; Montana, 20; Nebraska, 205; Nevada, 10; New Hampshire, 202; New Jersey, 445; New Mexico, 28; New York, 1942; North Carolina, 556; Ohio, 1462; Oregon, 129; Pennsylvania, 2786; Rhode Island, 47; South Carolina, 205; Tennesee, 620; Texas, 548; Utah, 129; Vermont, 231; Virginia, 689; Washington Territory, 45; West Virginia 404; Wisconsin, 780; Wyoming, 8; Total, 21,356.

The directory is printed from new Burgeois type on heavy tinted paper and is substantially bound. It makes a book of 200 large pages. The post offices are alphabetically arranged in each state, territory or province. The name of the mill, the kind of power used and the capacity of barrels of flour per day of 24 hours are given wherever obtained which is in thousands of instances, This work is indispensible to all business men desiring to reach the American Milling Trade.

Price Ten Dollars per copy, on receipt of which it will be sent post paid to any address. Remit by registered letter, post-office money order or draft on Chicago or New York made payable to the order of E. Harrison Cawker, publisher of THE UNITED STATES MILLER, Milwaukee, Wis.

DEAD—John Shamleffer, of the milling firm M. A. Shamleffer & Co., Council Grove, Kas.

THE Kentucky Millers' Association will meet in the Board of Trade building in Louisville, Ky, Sept. 6th, 1883.

FLOUR MILL OWNERS—Please send us your address, with capacity of your mill in barrels per day of 24 hours, and also state whether you use steam or water-power, or both.

A good machine is always worth a good price. So called *cheap* machinery is always dear at any price. Remember this when buying machinery.

THE Wisconsin State Fair will be held at Madison, from Sept. 10th, to Sept. 15th, inclusive. It is expected that the display will unsully attractive.

THE name of the *Grain Cleaner* has been changed to "*The Modern Miller.*" We wish its publisher a change of luck—from "purty fair luck," to a "regular bonanza."

FLOUR MILL OWNERS—Please send us your address, with capacity of your mill in barrels per day of 24 hours, and also state whether you use steam or water-power, or both.

WE are sorry to hear that the mill of W. Trow & Co., at Madison, Ind., has again been destroyed by fire. This firm has been especially unfortunate in having heavy losses by fire during late years.

THE milling capacity of the Pacific Coast is constantly increasing, and the export of flour is much greater than heretofore. California millers predict that the time is not far distant when flour exports will almost entirely take the place of wheat.

THE *Southern Miller* says :

The smell of fresh paint in a room may be effectually gotten rid of by placing therein a pail of water in which a few onions have been sliced.

That 's all very well, Bro. Wright, but then there is the smell of the onions—you know.

THE Case Manufacturing Co., of Columbus, O., will have a full line of their machinery on exhibition at the Chicago Exposition. It will be in charge of W. E. Catlin & Co., of Chicago. All millers visiting the Exposition will find this a good opportunity to examine the Case machinery.

WE call attention of our readers to the advertisement of T. C. Alcott & Son, Mt. Holly, N. J., manufacturers of turbine water-wheels. This firm has had a large demand for their wheels this year, and they always give satisfaction.

AUGUST 15th the Geo. T. Smith Middlings Purifier Co., of Jackson, Mich., took all of its employes off for an excursion to Detroit. It took 14 coaches to carry the employes and their families. Upon reaching Detroit the excursionists went by steamer to Grosse Isle, where lunch was served. The party reached home at 10 p.m., and serenaded Geo. T. Smith at his residence. It was a happy day for all concerned.

MANUAL OF AMERICAN PROTECTIONISTS.—The American Protectionists' Manual is a well-written book of about 200 pages, to which the student desiring informatton on the Tariff Question can refer for information and readily find the facts set forth clearly and briefly from the highest authorities. The work is just what is needed at this time, when the subject of Tariff, &c., is so prominent before the public. It can be procured of its author, Giles B. Stebbins, Detroit, Michigan, for 75 cents, postage included.

A WAUPACA correspondent writes us as follows, under date August 28.:

St. Mark's Church to-day was the scene of a double wedding, the contracting parties being H. W. Rowe and Miss Florence Taylor, and Wallace H. Lord and Miss Nellie Rowe. The ceremony was performed by Rev. George Gibson, of Marquette, Wis., and was witnessed by a few relatives and intimate friends of the parties interested. Mr. Rowe is deputy sheriff of Waupaca County. His bride is the eldest daughter of Dr. Geo. R. Taylor, one of the oldest physicians in the county. Wallace H. Lord is the manager of the Waupaca Star Flouring Mills. His bride is the daughter of Sheriff O. H. Rowe. The young folks left this afternoon for Milwaukee and Chicago, where they will enjoy their honeymoon.

A well-known Methodist clergyman, also a newspaper publisher, residing at Oconto, Wis., recently received a telegram, stating that an old friend of his at North Prairie was lying at the point of death, and that he had expressed a desire that he (the Oconto clergyman,) would preach his funeral sermon. He started for North Prairie at once, and when he arrived in Milwaukee called at this office at noon and received a dispatch stating that the North Prairie man was not yet dead. "Very well," said the clergyman, when he had finished reading the message, "that will give me all the afternoon to canvass for advertising for my paper. The fellow will probably die tonight, and I can attend to his case, and get back in time to get my new ads. in the next issue."

MR. G. BUCHHOLZ, of Frankfort, Germany, has been in Milwaukee for several days during the past month, and has conferred with Secretary Seamans, of the Millers' National Association, in relation to roller mill patents. The Sub-Executive Committee have called a meeting to consider the matter, which seems to be of some consequence, and in due time a report will be made.

LATER.—The Sub-Executive Committee met in Milwaukee, Aug. 28th, to consider the above mentioned matter, and expected Mr. Buchholz to be present, but he failed to make his appearance. After the meeting adjourned the committee learned that Mr. Buchholz had returned to New York City without notifying them.

THE statistician of the New York Produce Exchange, E. H. Walker, furnishes the following interesting information concerning the consumption of wheat in the United States:

"The consumption of wheat in the United States was uncertain. In New England some wheat flour, but mostly rye flour and corn meal, were used. In the Southern States 5,000,000 colored people consumed mostly maize bread. In portions of the country settled by Germans rye was used. The average wheat crop of the United States for five years, ending 1882 had been 424,525,189 bushels; average exports 144,303,236 bushels; average seeding 46,785,896 bushels; leaving 233,439,552 bushels for home consumption and reserves. The average population for the five years was 50,199,616. Dividing the amount left for home consumption and reserves by the population, would give 4.65 bushels per capita for the average consumption. The country grew 24,000,000 bushels of rye, most of which was consumed at home. Buckwheat and oat-meal were also used in the place of wheat flour. The 4.65 bushels per capita included reserves. Computing the fraction of 65-100 of a bushel as reserves would give only 32,629,750 bushels, which would be small reserves for the population. Considering all the facts, 4 bushels was a liberal estimate for the per capita consumption of wheat in the United States."

C. H. SEYBT, Esq. of Highland, Ill., member of the Executive Committee of the Millers' National Association, visited Milwaukee, Aug. 28th, and in replying to a question relating to the cry of small crops, expressed his fear that the cause for alarm about a scarcity of wheat was well founded. "Between now and the first day of next January," said the gentleman, "the entire world will be brought to a realization of the painful fact that there is a short crop. There is a shortage of over 100,000,000 bushels in this country, while France will show a deficit in the wheat crop of fully that amount. England also will be largely short in this year's yield, and this alarming shortage is bound to tell, sooner or later, in the breadstuff market all over the world. The shortage in this country is confined entirely to the winter wheat region."

Mr. Seybt was not prepared to express an opinion on the outlook for the spring wheat, but Mr. Seamens volunteered the information that the spring wheat crop is good, but not materially larger than last year's yield. Wisconsin and Dakota will have rather larger spring wheat crops than the previous season. Mr. Seybt, upon being further interrogated about his observations on his journey through the Southern States, resumed: "All the winter wheat in Missouri appears to be confined to six or seven counties, which have a phenomenal crop, and will make a good showing, but as soon as that is exhausted I don't know where the great surplus will come from. That is the question which we will all be debating before very long. All my European crop reports by letter and cable from week to week, are growing thinner. Now I am neither a bull nor a bear," said Mr. Seybt, impressively, "I am engaged in a legitimate business, and I am speaking of my candid opinion, the result of extensive and careful observation. There is no wheat-growing country in the world that will make a favorable showing with their present crops. Neither Russia, Hungary or Austria will go above their average, if they reach it. In the winter wheat belt, however, the outlook for corn is most excellent. Kansas will have a tremendous corn crop, and all the farmers are seriously considering the enlargement of their corn cribs."

UNITED STATES EXPORTS OF MERCHANDISE.

From advance sheets, furnished us by the United States Treasury Department, we make the following interesting extract:

The value of the exports of merchandise from the United States during the year ended June 30, 1883, amounted to $823,805,819, as against $750,542,257 during the preceding fiscal year, showing an increase of $73,263,562.

The effects of the short crops during the season of 1881, consequent upon the protracted drought, and other unfavorable meteorological influences which prevailed during that season, not only tended to diminish the exports of the agricultural products of the country the year ended June 30, 1882, but also projected themselves far into the year ended June 30, 1883. It was not until the month of October, 1882, that the exports of domestic merchandise from the country began to exhibit any material increase over the export of the corresponding month of the preceding year. The influence of the crops upon our exports of merchandise is evident from the fact that during the ten years ended June 30, 1882, 78 per cent. of our exports of merchandise consisted of products of agriculture.

The leading articles of exportation during the last fiscal year were, as during preceding years, cotton, breadstuffs, meat products, and petroleum, cotton being very largely the leading commodity.

It appears that during the year ended June 30, 1883, the value of the exports of cotton amounted to $247,326,621, as against $199,812,644 during the preceding fiscal year, an increase of $47,513,977; and that the value of the exports of wheat and wheat-flour amounted to $174,703,880, as against $149,304,773 during the preceding fiscal year, an increase of $25,399,057. It also appears that the value of the exports of corn and corn-meal amounted to $27,736,880, as against $29,840,031 during the preceding fiscal year, a decrease of $2,103,151; that the exports of meat products and dairy products amounted to $99,644,621, as against $114,463,726 during the preceding fiscal year, a decrease of $14,819,805; and that the exports of petroleum amounted to $44,913,028, as against $51,232,706 during the preceding fiscal year, a decrease of $6,319,678.

In this connection it is a matter of interest to advert to the large increase in the crops of the season of 1882, as compared with those of the season of 1881. This has led to a large increase in our exports during the fiscal year just closed, as compared with the exports of the preceding fiscal year. The increase in the crops is shown as follows:

Comparative statement showing the relative magnitude of the crops of *cotton, wheat, corn, rye, oats* and *barley* in United States during the seasons of 1881 and 1882, respectively.

Commodities.	Season of— 1881.	1882.	Increase.	Per cent. of increase.
Cotton....bales	*5,456,048	†7,025,000	1,568,952	28.8
Wheat..bushels	380,280,090	504,185,470	123,905,380	32.6
Corn...bushels	1,194,916,000	1,617,025,100	422,109,100	35.3
Rye ... bushels	20,704,950	29 960,037	9,255,087	44 7
Oats....bushels	416,481,000	488,250,610	71,769,610	17.2
Barley..bushels	41,161,330	48,953,926	7,792,596	18.9

*Crop season of 1881-2.

†Crop season of 1882-3, estimated from information furnished by Mr. H. G. Hester, secretary of the New Orleans Cotton Exchange. The magnitude of this crop will not be accurately ascertained until the close of the commercial year, August 31, 1883.

The cotton crop produced during the season of 1882 was larger by about 400,000 bales than any crop previously produced in this country. The wheat, rye, oats and barley crops were also larger than ever before, and the corn crop was only once before exceeded, namely, by the crop of the season of 1880.

The prospect at the present time (August 6, 1883), is that the aggregate of the crops of the season of 1883 will be quite as large as the aggregate of the crops of the season of 1882.

THE CAPACITY OF MINNEAPOLIS MILLS.

The present milling capacity of Minneapolis is shown in the appended table:

Name of mill.	Operated by	Bbls.
WEST SIDE.		
Anchor	C. A. Pillsbury & Co	900
Cataract	D. R. Balber & Son	600
Columbia	Columbia Mill Co.	1,000
Crown Roller	Christian Bros. & Co.	1,700
Dakota	H. F. Brown & Co.	250
Excelsior	E. V. White & Co.	800
Galaxy	Cahill, Fletcher & Co.	1,000
Holly	F. S. Hinkle.	250
Humboldt.	Hinkle, Greenleaf and Co.	775
Minneapolis	Crocker, Fisk & Co.	600
National	W. F. Gunn	150
Northwestern	Sidle, Fletcher, Holmes & Co.	1,350
Palisade	L. Day & Son	1,500
Petit.	J. A Christian & Co.	1,300
St. Anthony	Hinkle, Greenleaf & Co.	450
Standard.	E. V. White & Co.	1,500
Union	G. W. Goodrich & Co.	310
Washburn A.	Washburn Crosby & Co.	3,200
Washburn B.	Washburn Crosby & Co.	1,000
Washburn C.	Washburn Crosby & Co.	2,000
Zenith	Day Rollins & Co.	600
EAST SIDE.		
Pillsbury A.	C. A. Pillsbury & Co.	5,200
Phœnix	Stamwitz & Schober.	275
	Total capacity.	26,660

A year ago at this date the daily capacity was 21,250 barrels. Since that time the North Star and Model mills, with 600 barrels capacity, have been burned, while the Columbia and Minneapolis and Excelsior mills, with a total capacity of 2,400 barrels have been completed and put in operation. The Palisade mill has been thoroughly remodeled, and the capacity increased from 550 to 1,500 bbls. per day. Other less notable increases have been in the Washburn A., Galaxy and National mills. Another source of increase has been from the mills, while really no machinery was added to them, being able to make more flour on the wheat last fall in a given time than ever before, thus simply giving them a higher record. Of course it is understood by all that in giving the capacity of a mill, the maximum figures are universally used; but we must say that the amounts opposite the mills as above set down are nearer the real working figures than is usually the case with statements of the kind, it being our aim to get as near the exact truth as possible. —*Northwestern Miller.*

FLOUR MILL OWNERS—Please send us your address, with capacity of your mill in barrels per day of 24 hours, and also state whether you use steam or water power, or both.

BY the new Constitution of the State of Louisiana, the capital, machinery, and other property employed in the manufacture of textile fabrics, leather, shoes, harness, saddlery, hats, flour, machinery, agricultural implements and other articles of wood, marble or stone, where not less than five hands are employed, are exempted from taxation for the period of ten years.

A FEW WORDS ON FOUNDATIONS.

The importance of a good foundation in building, as in most other things, will not, we presume, be disputed. A structure, like an argument in logic, that is ill-founded, carries in it the germ of inevitable failure, if not of total annihilation.

There is seldom great scope for choice in the selection of sites for building purposes; and a man takes a plot of ground, as he takes a wife, for better or for worse. The nature of the subsoil in any district may generally be ascertained by inquiry with tolerable accuracy, but contingencies may often arise which will involve the builder in greater expense than he has reckoned upon. A loose bottom necessitates extra digging, or an influx of water involves pumping and consequent delay. We have known contractors to be very hardly treated at times by architects, in the matter of foundation. The modern iron-hearted practitioner, "conscientiously acting in the interests of his client," sternly declines to allow extras for unforseen calamities such as the above which ought, he thinks, to have been taken into account in tendering, while he as strictly insists upon exacting deductions for any unexpected advantages that may accrue to the builder; such, for example, as the fortunate discovery of sand on the site, which can be used for mortar.

The nature of the subsoil is best ascertained by sinking a well on the site. Clay is so liable to expansion and contraction from the alternate moisture and dryness of the weather, that it is no trustworthy bottom; and dry gravel is not only shifty, but subject to cavities which render it unreliable. In such cases, an artificial foundation of concrete should be provided. Too much moisture may kill the lime in the concrete, and in some cases, necessitate the use of a hydraulic lime. The mention of concrete leads us to reflect upon a popular superstition, which is very deep-rooted.

It is generally assumed that in order to secure a sound, compact bottom, the concrete ought to be thrown in from a staging at least six feet above the level of the trenches. This "long drop" is solemnly prescribed in specifications, and rigidly enforced in practice. We have known an architect insist on the resurrection of some twelve cubic yards of concrete, which had been peacefully deposited in the trenches *non requiescat in pace!*—because, forsooth, he declined to take the builder's word that it had been thrown in from a "proper height," and would not be content until he had seen the operation with his own eyes.

To what purpose? If six feet is a good heighth, twelve would be a better, and so on, until—what would be the effect of dropping concrete into a trench from a balloon, say five hundred feet above the level of the ocean? Would not the mixture be a trifle scattered before it reached its destination?

Throwing in concrete from a height is supposed to consolidate it, but does it really do so?

If two bodies of unequal weight in proportion to their bulk be let fall from a height at the same time, the heavier body will reach the ground first, and the greater the height—that is, the longer they are exposed to the action of gravity—the greater will be the *difference of time* in which they will reach the ground. Now the ballast, or gravel, which forms the principal ingredient in concrete, is just twice as heavy as the lime with which it is mixed; and it follows, therefore, that the greater the height of the staging from which concrete is thrown, the greater is the tendency to *unmix* it by sending all the ballast to the bottom, and all the lime to the top.

Let there be no "long drop" then; but let the concrete be thoroughly mixed, wheeled in at a level, and well rammed.

Of all bottoms for building perhaps a coarse, wet gravel is the best—a good, firm gravel, that shows a clean and almost vertical side when cut into with the spade—and with such a bottom concrete is rarely required. Of clay we have already treated; but there is a kind of blue shale, which forms an excellent foundation so long as it is preserved from the action of the weather by a layer of concrete, but if left open to the atmosphere it will slake and become quite soft.

Underground watercourses are occasionally to be met with, and are exceedingly dangerous to all foundations. Sometimes they can be conveyed away in drain-pipes, and occasionally it is necessary to arch over them; but it is never advisable to interrupt their course without providing some means of passage for them, as they are liable to unsettle the surrounding soil to an incalculable extent.

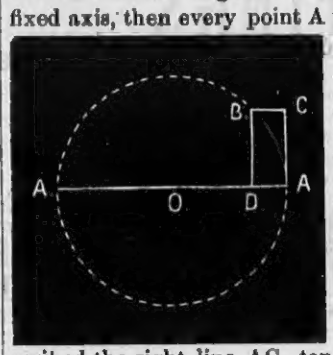
It is generally supposed that no foundation better than a rock is anywhere obtainable, and Scriptural authority instances the "wise man who built his house upon a rock." No doubt there are rocks *and* rocks, and although we do not question the stability of the Eddystone rock, still the question arises, with some rocks, as to what is underneath them? Small masses of rock usually lie in loose shifty beds composed of their own fragmentary *debris;* and, in large masses, where the strata dip considerably, there is danger of their cracking and slipping. Here concrete will come into requisition to bring the bottom up to one level. A great difference in depth should never be made suddenly between two parts of a building, either in brickwork or masonry; as the greater number of mortar joints in the deeper portion will cause such an appreciable reduction of height in setting as to cause cracks in the walling above. Where there is a change of depth in the foundation of a wall it should be made gradually in steps of about 4 feet high, so as to divide the difference in the number of joints.

A totally unyielding bottom, such as a solid rock, is at times undesirable. Suppose we have a wall of brick or rubble faced with ashlar. The greater number of joints in the former will cause a greater reduction of height in setting, and the facing may thus have to sustain a superincumbent weight which should have taken its bearing upon the walling behind, and which may crush the ashlar if the bottom be yielding, but if the bottom yield the ashlar will sink so far as to find its level with the hearting or walling behind it.

Above all, in foundations let the materials be solid and good. Eschew burrs or place bricks, and remember that good stock brickwork in mortar will safely carry between eight and nine tons for every square foot of sectional area.—*Building and Engineering Times.*

CENTRIFUGAL AND CENTRIPETAL FORCES.

These are usually defined as the forces which urge a body to avoid (*fugere*) or seek (*petere*) a centre. Owing, however, to a prevalent vagueness in the use of these terms, it will be well to illustrate their meaning in one special case. Suppose a body to rotate with a constant angular velocity around a fixed axis, then every point A will describe a



circle ABA, in a plane perpendicular to that axis, of which the centre O will be a point in the axis itself. If perfectly free, the point A would described the right line AC, tangential to the circle, but not being permitted to do so it exerts a certain constant strain in the direction of the radius OA_1, which strain calls forth an equal resisting force. The strain in this case is called the *centrifugal* force, the force of resistance the *centripetal.* To measure the latter, and therefore also the former, it is only necessary to consider the space AD through which the body has been urged by it during the time-element required for the description of the elementary arc AB.

Calling F the accelerating centripetal or centrifugal force, we have on the one hand (Acceleration) $F = \frac{2\ AD}{t^2}$ and on the other, by geometry, $AD = \frac{AB^2}{AA_1} = \frac{AB^2}{2r}$, where r is the radius of the circle; consequently

$$F = \frac{1}{r} \cdot \frac{AB^2}{t} = \frac{V^2}{r};$$

V being the velocity with which A moves in the circle. Hence the centrifugal force in a given circle is directly proportional to the square of the velocity.

If the time in which a complete rotation is made be represented by s, then

$V = \frac{2 \times 3.14 \times r}{s}$ and $F = \frac{4 \times 3.14^2 \times r}{s^2}$; that is to say, the angular velocity being the same, the centrifugal forces in two circles are proportional to their radii. Thus, considering the earth as a sphere of radius R, the radius of the circle described by a body at a point whose latitude is A will be R cos. A, and F and f being the centrifugal forces at the equator and at the point in question, we have $f = F \cos. A$. If moreover f be resolved into two components, one horizontal and the other vertical, the latter will have the magnitude $= f \cos. A = F \cos^2 A$ will be directly opposed to gravity, and thus tend to diminish the weight of the body. At the *equator* the diminution of gravity owing to centrifugal force amounts to $\frac{1}{289}$th of what gravity would be were there no rotation; so that if the earth rotated with $17 = \sqrt{289}$ times its present velocity, bodies at the equator would have no weight whatever. The above result may also be expressed by saying that the force of gravity at the poles, where there is no centrifugal force, exceeds that at the equator by $\frac{1}{289}$th of the former. This is under the assumption that the earth is a homogeneous sphere; its actual form, however, is that of an oblate spheroid, in consequence of which the force of gravity at the poles is still further increased and the above ratio augmented to about $\frac{1}{200}$th.

By the term centrifugal force as applied to a body describing any curve in space, is usually understood the force in virtue of which it is deflected from a restilineal path. At the instant under consideration we may in fact conceive the body to be moving in the circles, which osculates its actual trajectory, so that, if p denote the principal radius of curvature of the latter, and v the velocity of the body, $\frac{v^2}{p}$ will be the expression for the centrifugal force.

KANSAS CITY'S MILLING INTERESTS.

It has been stated that before the close of twelve months from the present time the addition of much capital to the milling enterprises of the city will have been made. Although the city will progress at its usual rate, the material increase in this particular branch of industry will be in greater ratio than that in other lines. Agencies are now at work that will make Kansas City one of the best milling marts in the country, and the reasons upon which this belief is based are not occult.

The opening up of the Kansas City, Fort Scott and Gulf road to Memphis is one of the best things for the wheat and hog product of this part of the country that ever occurred. It is confidently asserted that it will place the city in a pre-eminently favorable position and give it advantages of a particularly superior kind.

A group of gentlemen were discussing the prospects yesterday in one of the halls of the board of trade building. They were men experienced in regard to the subjects upon which they spoke, and they agreed in saying that if the future milling interests of the city would not in a comparatively short time achieve the position of the packing interests, indications were very deceptive.

"It will be about the middle of September when the road is opened," said one, "and" he continued, "Kansas City will then have direct access to the Southern States east of the Mississippi river, a thing we have never before enjoyed. It will open up a great market. The people who live in these States are great consumers of the flour product and have made St. Louis the milling center that it is. Now we will come in for a large share of the trade. The market for packing-house goods will also be benefitted.

The opinion was also advanced that the road would not open any great export outlet to New Orleans, but the reason given was that New Orleans was not at present a grain market of much consequence. Better grain equipments would be provided, however, at New Orleans, and the place would come into more prominence as a grain mart.

Kansas City is a great storage point, much wheat being in the elevators here. The amount in store at present, however, is quite small, for this place at this season. The reports show that at the beginning of the present week the number of bushels of wheat in store was 197,000, and the quantity of corn 100,000 bushels.

This city is a good commercial market for wheat, and not exclusively a millers' market like that of St. Louis. The position of this city will always give it the advantage by from eight to fifteen cents a bushel over St. Louis because of the nearness of Kansas City to the great wheat producing regions. The facilities for conducting the milling business are on a par with those of other places, and the great advantage to be gained in the price of the grain at the city, should insure unprecedented improvement.

One mill, a West Kansas one, manufactures now almost exclusively for the southern trade, but its territory might be said to be confined to Texas.

"Kansas City is already a more steady commercial market for wheat than St. Louis," said a well-informed gentleman, "and it is better that it should be. There the millers control everything, and if they stand out of the market it demoralizes matters generally. Here it is quite different, and the accession of more millers to the market would greatly better matters."

New mills may be expected to be put up in the west and the east Kansas bottom, and those already established will be compelled to have the capacity enlarged and increased, should no discouraging circumstances arise.

The present large crop returns throughout the West have been regarded as the most auspicious sign, and an indication that the coming season will be one of unusual prosperity.—*Kansas City Times, Aug.* 14.

CARLINVILLE ROLLER MILL CO.

On Thursday last the Secretary of the State issued a certificate of incorporation to the Carlinville Roller Mill Company. The incorporators are: S. S. Woodward, David Gore, Peter Heinz, W. M. Chiles, George Siegel, John Kessinger and H. W. Weer, with an authorized capital stock of $16,000 divided into shares of $50 each. It is the intention of the company to purchase the present Weer mill of Messrs. Farrel & Flint, which can be secured for $16,000, including both the real and personal property connected therewith. Another story and an attic will be added to the mill building during the present season, preparatory to introducing the roller process, which will be put in next spring. It is agreed upon the part of the stockholders that the board of directors shall be instructed to employ H. H. Weer as manager of the company for the next five years at the reasonable salary, to be fixed annually, and to allow him as further compensation all the net annual profits of the business of the corporation in excess of 6 per cent. interest on the capital stock for the first year, 7 per cent. the second, 8 per cent. the third, 9 per cent. the fourth, and 10 per cent. fifth, provided, said Weer shall conduct the business of the company in a manner satisfactory to the board of directors. The previlege is also given to Weer to purchase the stock of the company at any time within five years from date of commencing business, at a price not to exceed the face of the stock and 10 per cent. per annum premium, all dividends received to be deducted from the premium; the board of directors to be instructed that whenever Weer shall signify his desire to purchase any of the stock to determine by lot whose stock shall be sold and delivered up to him in case no holder or holders shall voluntarily sell the full amount desired; and no holder of stock can transfer his stock to any other person except by endorsement, whereby the right of Weer to purchase the same shall be made a condition of such assignement.

The books of the company for receiving subscriptions to the capital stock are now open, and it is necessary that the full amount should be subscribed and paid in within the next thirty days, in order to complete the organization.—*Carlinville, Ill. Democrat, July* 7, 1883.

A SCHOOLBOY ON CORNS.—Corns are of two kinds, vegetable and animal. Vegetable corn grows in rows, and animal corn grows on toes. There are several kinds of corn; there is the unicorn, the capricorn, corn dodgers, field corn and the corn you feel most.

It is said, I believe, that gophers like corn, but persons having corns do not like to "go far," if they can help it. Corns have kernels and some colonels have corns.

Vegetable corn grows on ears, but animal corns grow on feet at the other end of the body.

Another kind of corn is the acorn; this grows on oaks, but there is no hoax about the corn. The acorn is a corn with an indefinite article indeed. Try it and see. Many a man when he has a corn wishes it was an acorn.

Folks that have corns sometimes send for a doctor, and if the doctor is corned, he probably won't do so well as if he isn't. The doctor says that corns are produced by tight boots and shoes, which is probably the reason when a man is tight they say he is corned. If a farmer manages well he can get a great deal of corn on an acre, but I know of a farmer that has one corn that's the biggest achre on his farm.

The bigger crop of vegetable corn a man raises the better he likes it; but the bigger crop of animal corn he raises, the better he does not like it. Another kind of corn is the corn dodger. The way it is made is very simple, and it is as follows—that is if you want to know: You go along the street and meet a man you know has a corn, and a rough character; then you step on the toe that has the corn on it, and see if you don't have occasion to dodge. In that way you will find out what a corn dodger is.

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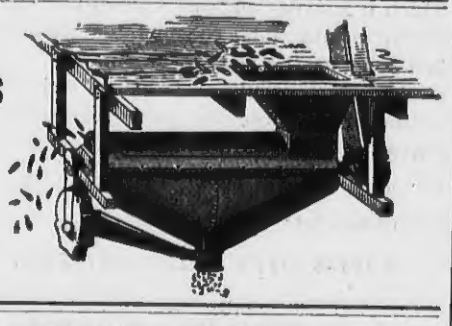

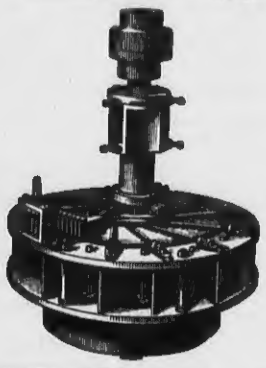

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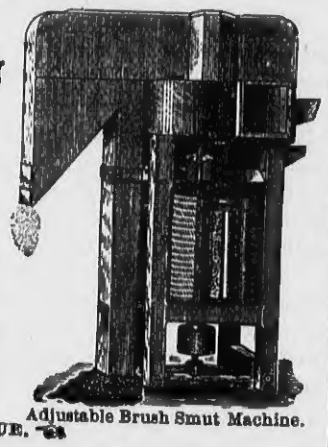

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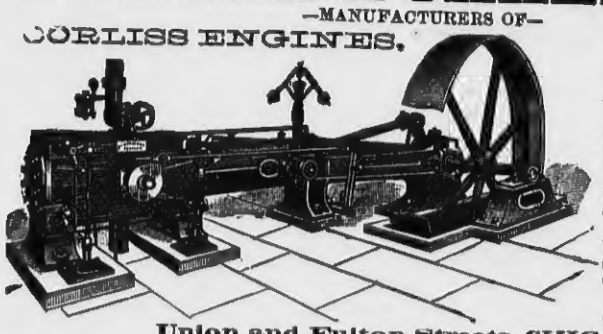

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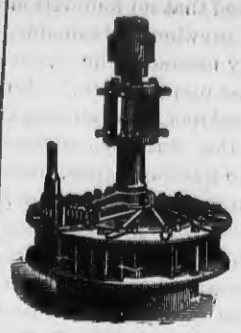

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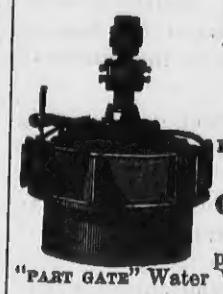

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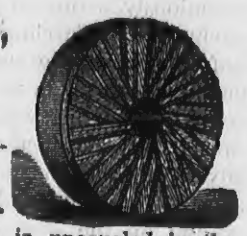

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A SUPERB MILL.

The New Crescent Mills at Grand Rapids, Mich.

A little more than a year ago Messrs. C. G. A. Voigt and Wm. G. Herpolsheimer under the firm name of Voigt's Milling Company, bought the Crescent Mills at the west end of Pearl street bridge and decided to rebuild it and make a first-class mill of it, one that should have no superior in the quality of work done, in the United States. They wanted perfection, so far as humanity is able to furnish it. So they secured the services of Mr. Henry Crow, who built the mill originally, and who had subsequently remodeled the Star mills for them, told him what they wanted, and that they desired a roller mill with a maximum capacity of 400 barrels of flour daily, and that the whole matter of rebuilding and fitting the mill would be under his control, the money would be furnished and he must do his best. On the 7th day of August, 1882 the work began. The time has been fully occupied since and on the 9th inst., a year and two days from the outset, the new mill was put in operation. It is, as stated in the head of this article, a superb mill, one of the largest in the State—there are but two or three others as large—and one of the best in its workings, designs and products in the world.

An *Eagle* reporter learned these things this forenoon as he made a careful and critical examination of the mill in company with Mr. Voigt and Mr. Crow—for ye reporter, though not a miller, has had the benefit of a critical inspection of the largest mills on the continent in company with gentlemen who could make their processes so plain a child could understand them, and hence is not wholly a novice in such matters. The new Crescent Mills are properly gradual reduction or roller mills, the only mills in town that can be so denominated, technically. The motive power, water, is furnished by four American Turbine wheels from Dayton, Ohio, with a capacity of 125 horse power, and so arranged that all or any or none of them can be used; they are so arranged steam may be used to propel the main shaft, and one of these days it will probably be put in, to use when extremely low or high water prevents the use of water power. The grinding—that expression is almost obsolete now, in modern milling—is done by twenty-eight pairs of Gray rollers, made by E. P. Allis & Co., of Milwaukee, and by three runs of stones. These are assisted in the process of reducing wheat to flour of different grades and to middlings, ships and fine middlings, by eight of the Geo. T. Smith and two of the Gray patent middlings purifiers, by a "scalper" with ten rolls, by two chests of bolts of eight reels each and one of six, and by two of the patent Silver Creek Centrifugal reels. Of course these are aided by a full set of machines for cleaning and scouring the grain, taking out all cockle, oats and other foreign substances, all of the latest and most approved patterns and designs, and perfect in the performance of their allotted tasks.

As stated above, the mill has a maximum capacity of 400 barrels of flour daily, but will probably not be run to a speed of more than 300 or 350 barrels, as an average. This will keep eighteen millers and other employes busy, besides the proprietors. The mill has a capacity of storing 35,000 bushels of grain and about 150 tons of feed. The processes of the mill might be fully described in these columns, how after the grain is fully cleaned it goes to the first set of rollers or breaks and there is split at the seam when it goes to the "scalper" and the dirt which the scourer or polishing machine could not remove is brushed away; how it then goes to the second set of rollers or breaks, then to the third, each time some of the flour stock being separated from the middlings by the purifiers, then to the fourth, fifth, sixth and seventh breaks, and some to the stones, and then to the packers; how the product is graded and classified by the head miller and so much, say 30 per cent., is put into patent, 62, per cent. into "bakers'" or second grade and the balance into the lowest or cheapest grade; how the grain, some of it, travels through over 3,000 feet of spouting, a thousand feet of elevators, and nearly a thousand feet of conveyers at the different reels; how in fact it starts in from the clean wheat in one corner of the mill, then through all the rolls, purifiers, reels or bolts, conveyers, bins and chests it goes from the basement to the fifth story and back down, back and forth, until it finally reaches the flour chest from which the packers take it—but to the uninitiated all these things would be Greek, and to the practical, modern miller, such explanations would be useless.

But there are some things about this mill that are worthy of special mention, that but few mills have. In the first place, so perfect is the adjustment of the machinery, so admirably are the bearings arranged, there is scarcely a particle of vibration of the walls or frame of the structure. The machinery is so noiseless you could not tell from the sound whether the mill was running or not, thirty feet from it. Of course when machinery is admirable in action its results must be perfect. Again the mill is remarkably well constructed for keeping clean. It is well known that insects and vermin are liable to infest a mill and if they get into its product, spoil it. This mill has plastered walls, its conveyers, spouts, bolts, everything are so tight, no dust flies from them, and men can get all about them or through them to thoroughly inspect and clean them. And every part of the mill is light, another effective preventative of vermin. In this respect the mill is the most perfect the writer has ever seen, and would gladden the heart of any miller in the land. Of course this is another advantage as to the product.

The mill is a monument to the business energy and good sense of its owners, and to the great skill of its designer and builder, Mr. Crow, who is undoubtedly one of the most accomplished millwrights on the continent. The very first time the machinery was set in motion the mill worked perfectly—there wasn't the slightest hitch or fault in any part, and no imperfection of product. This fact, to practical millers, tells the whole story, and will give the public a pretty good idea of how excellent its product will be. Of course the mill will be taxed to its capacity so soon as its brands of flour are put on the market, and will be another of the institutions which make Grand Rapids famous throughout the country. —*Grand Rapids Eagle*, (*August* 11).

THE MANUFACTURE OF LEATHER BELTING.

Thorough scouring is one of the indispensable requisites in good belt making, for by this operation the "bloom" from the bark liquors, with other coloring and resinous matters, not actually adding to the strength of the leather are washed out. For this purpose the leather, having been thoroughly wet, is placed—either a whole or half hide as may be desired, at a time—upon the movable bed of the scouring machine, which may be easily and quickly moved from side to side, or forward and backward, as necessary. Over this bed, and attached to an arm from a shaft, is a sort of box, in which are fixed scouring stones similar to those used by curriers. There are two of these stones, one in each side of the box, and as the arm moves forward one of them makes a stroke on the leather, while with the backward movement the other gives a similar stroke. These stones are accompanied by stiff brushes, a small jet of water at the same time constantly directed to where the stoning and brushing are being done. The workman is all the time moving the table on which the leather is spread out, so that this scouring may be effected on every portion, and he can make the strokes of any desired force. This machine will do as much scouring as it would be possible for three or four men to do by hand, and it is thought to do the work far better for leather to be used in making belts, as the powerful strokes it gives are very effectual for the thorough "setting out," or smoothing of the leather, making it to lie flat and even.

The "stretching," is of especial importance in the making of a belt which is expected to run without giving trouble, for the necessity of having frequently to "take up" belts which stretch so as to become too loose is a serious inconvenience in a factory, where, oftentimes, a number of hands must stand idle until the difficulty is remedied. The stretching is accomplished by making fast each end of a piece of leather in clamps, then, with a lever, putting on all the strain which the leather will bear, and allowing it to stand under this strain for several hours. In this way the stretch is generally so well taken out that a new belt, where it has been properly put up, may often be run for months without requiring any attention.

"The "jointing" or "cementing" embrace departments of the business which formerly received very little attention, but are now recognized as of great importance. In the jointing, the ends having been made perfectly square, they are beveled and skived down, so that, where the laps occur, the belt shall be of an even and uniform thickness, and the fitting as nice and true as if the whole belt where cut out of one piece of leather. It is especially important that this work be well done, for the smoother the surface of the belt is made the less air will pass between it and the pulley, and the closer the contact of the belt and pulley the more machinery will the belt drive. The cementing of these ends or laps together is said to contribute much more to the strength of the belt than the riveting, and we have seen tests of belting, in which only cement was used for fastening the different lengths, where the leather gave way at other places rather than where the joint was made.

It is impossible, however, to make good belts without having a first rate selection of just the right kind of leather—to obtain which the hides should be selected and the tanning operation conducted with that end in view. The tanning process is not hurried, as it is in many cases with sole leather, and no hides are "worked in" which have any brands or cuts that would injure a belt. The best hides for this purpose are those from cattle four or five years old, as the hides of animals of that age have not been repeatedly stretched or shrunken, from changes in their condition, as is often the case with older ones, and the leather made from such hides is more likely to permanently remain straight. "I give it as my judgment, of thirty years of observation and experience," said the Hon. Marshall Jewell, "that the best and cheapest belt in the world is one made from the hide of a four or five year old bullock, that has been fed on grass, the hide being tanned thoroughly with bark, and a long time given to the process, and the belt then being run with the grain or hair side to the pulley.

ITEMS OF INTEREST.

Mexican Tin.—The first ton of Mexican tin has lately been received in the United States. It came from the Durango district, near the mountains of the same name; and is said to be bright, clear, and of good texture. It was discovered by Mr. Hans Freeman, of Australia, who has for more than a gear been searching for evidence of the tin lodes and placers spoken of by the old Spanish settlers.

The mere making of the governor weights light enough so that by the use of high steam-pressure and every other element of coaxing the engine will experimentally get up a desired maximum rate of revolution, does not signify that the engine is a high-speed engine. A high-speed engine must be properly proportioned and balanced, so that it will not only give the speed of revolution, but will do so without appreciable jar and tremor, and will possess the properties of strength and stiffness, so that continuous work of the engine at high speed will not require abnormal repairs or be significant of short life.—*Ex.*

Weevils, Cockroaches and Mosquitoes.—A. T. Elliott says: Adjacent to my office is a ware-house filled with wheat. This spring the grain weevils therein began to migrate and infested my premises. We therefore sprinkled some buhoch or insect powder over the grain and swept the insects up by the quart. Those which migrated to my office were treated with a sprinkling and it cut short their career. I am convinced that a judicious use of this powder on board each grain ship would save an immense amount of loss.

I have seen the insect powder used in a large mill, and it brought cockroaches out in quantities that astonished the miller. A friend of mine, who cannot sleep if a mosquito is within a mile of him, tells me he has only to put a little powder on some burning paper in his room and there is "perfect peace."

Brazilian Import Duty on Flour.—The Consul-General at Rio gives the following information concerning the imports of flour into Brazil:

In my annual report I stated that the duty imposed by Brazil on the import of wheat flour amounted to 64 cents per barrel. I will now state that if the same flour be shipped to the interior province of Minas Geraes it would in addition be subject to a provisional duty of $1.32 per barrel. The freight charge on a barrel of flour a distance of 200 miles on the Government railroad leading from this city into that province, being as far as the road is now completed, $1.26. As Minas Geraes contains a population of over two millions it can be seen that its heavy tax can affect American flour trade very much.

Air-Proof Cement.—According to a foreign contemporary, M. C. Pascher finds that the only substance which is really efficacious for rendering cements unalterable by the air is a cold solution of one part of sulphate of iron in three parts of water. The cement articles are left in the solution for 24 hours; at the end of this time they take a greenish-black tint, due to the hydrated protoxide of iron. The absorbed solution is decomposed in the interior of the cement; the weight of the cement is increased 10 per cent.; all the pores of the mass are thus stopped by the hydrate, and as this combination is not attacked by the air, the cement itself becomes unalterable. Cement facings may be whitewashed with several coats of the solution. After drying, the cement may be covered with a wash of ochre, or by a solution of 10 per cent. of sulphate of alumina in three parts of water. For a greenish-white coating, the surface may be first washed with a solution of chrome alum, and then with soapsuds. Either of these coats may be painted in distemper. When oil colors are used, inconvenience may be avoided by washing the cement with soapsuds, letting it dry, and rubbing with a brush or linen cloth until the surface shines.

This is a description in *Le Genie Civil*, of July 1, of a floating grain-elevator. The structure was made at Bordeaux and placed in the harbor to unload the vessels arriving with cargoes of grain. It contains apparatus for weighing, cleaning, and sacking the grain. From the ship's hold it can unload, weigh, clean, weigh again, put into sacks, and reload into trucks 150 tons of grain per hour. The elevator is mounted on a barge, which is propelled by a screw worked by a compound surface-condensing steam-engine that furnishes the motive power for all of these operations.

A New Smoke Consumer.—Mr. John S. Barwell, engineer of William Glenn & Sons, of Cincinnati, has the latest and most simple smoke consumer. On the bridge-wall he constructs a section of tubes of fire-clay, the tubes two feet in length, with a diameter of two inches. He starts the fire with coke, and the tubes soon get red-hot, and then, no matter what fuel is used, the smoke disappears in passing the fire-clay tubes, and beyond them is pure white flame. The cost of the reconstruction of a furnace is about $15. The new smoke inspector has seen this "device," and is surprised at the efficacy of so cheap and plain a method of smoke prevention.

The steamer Great Eastern, after lying idle for many years is about to be employed again. "A company has been formed," says the *St. James Gazette*, "to purchase the vessel for the coal trade between Queen's Ferry (Firth of Forth) and the Thames. It is intended to put 20,000 tons of coal on board, in sacks at each voyage. The vessel is described as being in splendid order, having been carefully and expensively maintained."

A second electric boat, 46 feet in length and capable of carrying fifty passengers, has just been launched on the Thames. The motive force lies concealed in seventy boxes, each of 1-horse power, stored under the floor of the boat, and at the end there is a Siemens' dynamo, the spindle of which is continued so as to form the screw without intermediate gearing. A speed of nine miles an hour can be maintained for six or seven hours, when the secondary batteries have to be replenished. There is no noise nor heat, nor smoke, nor waste, and the machinery takes up so little room that practically the entire boat is available for passenger accommodations.

Milling and Agriculture in Mexico.—Millions of bushels of corn and wheat are raised in Mexico, and as nearly all cultivation of soil is done by irrigation, crops are much more certain than in the United States. The ploughs used are wooden ones, like those used in ancient Egypt, made of a straight piece of mesquite timber, a yard long, pointed at one end, and wedge-shaped at the bottom. On top of this is set, at an angle of, say, 25 degrees, a long pole, which, going forward, is attached to a cross-bar, which is tied to the horns of oxen; on the rear end a single upright stick serves for the handles, by which the peon guides his plough. With this primitive instrument the husbandman ploughs a gutter about three inches deep and five inches broad at the top, and his work, except sowing and covering, is done. When the wheat is cut and housed and stacked (and this is done in April and May) it is spread upon an adobe floor surrounded by a wall of adobe six feet high, and upon this are turned in a number of wild horses from the range. Young boys keep them running around until the grain is trodden out, and then the mass is thrown upon another floor on a level with the top of the wall. Here it is cast up with wooden paddles into the air, and the grain separated from the straw and chaff by the wind. Nearly all the food eaten by the thousands of people in this country consists of grain. There are no small mills, very few mills of any size, and no mills for grinding corn. All the poor and most of the well-to-do eat corn, and to reduce it to meal they must, each for his own family, pound the corn with one rock upon another. —*British Mail.*

NEWS.

Burned—Charles Embler's flour mill at Walden, N. Y.

Geo. L. Hays, Piketon, O., is now operating his mill on the Case system of gradual reduction.

Lucas & Aikens, Uhrichsville, O., will start up their mill on the Case system in a few days.

Meyerhoff & Bickings' mill, at Hawthorne, Ill., burned recently. Loss $8,000; insurance $4,500.

Burned, Aug. 26th, the Huntsville steam flour mills at Huntsville, Ala. Loss $60,000; no insurance.

L. N. Crill, Richland, Dakota, has a No. 1 double purifier in operation, furnished by the Case Mfg Co.

J. W. Bard, Mt. Union, O., is running rolls and purifiers furnished by the Case Mfg Co., Columbus, O.

The Case Mfg Co., Columbus, O., have furnished James Allen, Greenport, N. Y., with purifier and rolls.

W. E. Brain, Oxford Mills, Wis., has ordered 1 single purifier from the Case M'fg Co., of Columbus, O.

The Case M'fg Co., Columbus, O., have an order from C. Seely, Crete, Neb., for 2 No. 2 double Case purifiers.

L. Clisby & Sons, Parker, Dakota, are running rolls and breaks furnished by the Case Mfg Co., Columbus, O.

D. C. Briggs, North Bend, Mich., has purchased a porcelain roller mill of Messrs. Allis & Co., Milwaukee.

The Case Mfg Co., Columbus, O., have lately furnished Wm. V. Banks, Versailles, Mo., with one Case purifier.

J. S. Bristol, Auburn, N. Y., has put in rolls, breaks and scalpers purchased of the Case Mfg Co., Columbus, O.

The New London Mill Co., New London, Mo., are running rolls furnished by the Case Mfg Co., Columbus, O.

The Geo. T. Smith M. P. Co., have received an order from W. T. Pyne, Louisville, Ky., for one No. 3 purifier.

H. B. Powell, Shawneetown, Ill., is putting in a centrifugal reel, furnished by the Case Mfg Co., Columbus, O.

The Case Mfg Co., Columbus, O., have furnished Banks & Sweeny, Blackburn, Mo., with breaks, rolls, purifiers etc.

The Case Mfg Co., Columbus, O., have lately furnished Allen & Co., Lenox, Iowa, with a line of rolls, purifiers, etc.

The Geo T. Smith M. P. Co., have recently shipped two car loads of purifiers to the Pray Mfg. Co., Minneapolis, Minn.

A. C. Godshell & Bro., Lansdale, Pa., recently ordered a porcelain roller mill from Messrs. Allis & Co., Milwaukee.

The Case M'fg Co., Columbus, O., have an order from D. P. Scott, Blair, Neb., for 3 pairs rolls with patent automatic feed.

Thos. Bradford & Co., Cincinnati, O., have placed an order with the Case Mfg Co., Columbus, O., for breaks and rolls.

J. B. Harrison, of Evansville, Ind., has ordered of the Jno. T. Noye Mfg Co., of Buffalo, N. Y., a double Stevens roller mill.

W. H. C. Kemp, Williamsport, Md., recently purchased a Gray's noiseless belt roller mill from Messrs. Allis & Co., Milwaukee.

The Geo. P. Smith M. P. Co., have received orders from Messrs. Rambo Bros., Dresden, O., for three No 2 Geo. T Smith purifiers.

Simon Gebhardt & Son, Dayton, O., have ordered 2 pairs rolls with patent automatic feed, from the Case M'fg Co., Columbus, O.

John Ochsner, Waumandee, Wis., is operating a No. 1 double Case purifier, purchased of the Case Mfg Co., Columbus, Ohio.

Edw. P. Allis & Co., of Milwaukee, Wis., lately sold one of their Gray's noiseless belt roller mills to Jno. D. Sheaver, Monrovia, Md.

The Case Mfg Co., Columbus, O., have furnished O. Crisman, Denver, Col., with smooth rolls, with patent automatic feed.

Smith, Lawther & Co., Nickerson, Kans., are operating their mill on the Case system of gradual reduction with splendid results.

Loeser, Clark & Co., Cuyahoga Falls, O., have ordered 4 feed boxes from the Case M'g Co., Columbus, O., for their Smith purifiers.

S. P. Warner of Fostoria, O., whose mill is being remodeled by Stout, Mills & Temple of Dayton, O., will start up about Sept, 5th.

Baily & Rush, Marengo, Iowa, are remodeling their mill, putting in breaks and rolls from the Case Mfg Co., Columbus, Ohio.

H. V. Line, Springfield, Pa., is putting in another pair of Stevens rolls, to be furnished by the Jno. T. Noye Mfg Co., Buffalo, N. Y.

The Case Mfg Co., Columbus, O., are furnishing the Montgomery Oil works, Montgomery, Ala., with a line of their machinery.

P. Rainey, Petersburg, Ill., has ordered two automatic feed boxes for his Garden City purifiers, from the Case Mfg Co., Columbus, O.

Bidstrup Bros., Carrolton, Mo., recently purchased a Gray's noiseless belt roller mill of Messrs. Edw. P. Allis & Co., Milwaukee, Wis.

The Case M'fg Co., Columbus O., are furnishing M. S. Bacon, Tiffin, O., with 3 additional pairs of Case rolls with patent automatic feed.

Caps & Schertz, Hilton, Ill., have put in one pair smooth rolls with patent automatic feed, furnished by the Case Mfg Co., Columbus, O.

The Rathbun Co., of Deseranto, Ont., are putting in additional Stevens roller mills, ordered of the Jno. T. Noye Mfg Co., of Buffalo, N. Y.

Crouch Bros., of Erie, Pa., have added a No. 3 Geo. T. Smith purifier to the large number of these machines they already have in use.

E. H. Brooks, Carroll, Iowa, has lately put a No. 2, double purifier in his mill, same being furnished by the Case Mfg Co., Columbus, O.

Stammwitz & Schoeber, of Minneapolis, Minn., are placing in their mills one No. 1 and one No. 2 Geo. T. Smith middlings purifiers.

The Case Mfg Co., Columbus, O., have an order from C. S. Thomson, Utica, N. Y. for one pair smooth rolls with patent automatic feed.

The Geo. T. Smith M. P. Co., are furnishing Jno. D Shearer, of Monrovia, Md., one No. 5 Martin centrifugal reel and two No. 0 purifiers.

Kloose & Bradford, Creston, Iowa, are remodeling their mill and putting in breaks, rolls, purifiers, etc., from the Case Mfg Co., Columbus, O.

The Geo. T. Smith M. P. Co., have shipped one of their No. 0 purifiers to L. P. Sharpless, Oxford, Pa., on the order of the Barnard & Leas Mfg. Co.

C. Templeton, Sherpsville, Pa., has ordered of the Jno. T. Noye Mfg Co., Buffalo, N. Y., a double roller mill with Stevens patented corrugations.

Edw. P. Allis & Co., Milwaukee, Wis., recently sold G. W. Woodruff, Columbus, Ga., four pair more of Allis rolls, in Gray's noiseless belt frames.

Edw. P. Allis & Co., Milwaukee, Wis., lately received an order from M. D. Hammon & Son, Logan, Utah Ter., for a Gray's noiseless belt roller mill

Edw. P. Allis & Co., of Milwaukee, Wis., recently sold Messrs. Willy & Co., of Appleton, Wis., another Gray's noiseless belt roller mill.

The Geo. T. Smith M. P. Co., have recently filled an order for the Fargo roller mills, for one No. 3 double purifier and one No. 1 centrifugal reel.

The Case Mfg Co., Columbus, O., have furnished Northrup Bros., Wyandott, Kans., with two pair smooth rolls, with patent automatic feed.

The Geo. T. Smith M. P. Co., have received orders for one No. 3 centrifugal reel and two No. 1 purifiers, from Wm. H. C. Kemp, Kemp Station, Md.

B. F. Gump, of Chicago, Ill., has telegraphed the Jno. T. Noye Mfg Co., of Buffalo, N. Y., to ship him a single Stevens roller mill for bran bruising.

The Weed & Gumaer Mfg Co., Weyawega, Wis., recently purchased a Gray's noiseless belt roller mill of Messrs. Edw. P. Allis & Co., Milwaukee, Wis

Baker & Co., Winchester, Pa., are putting in a Gray's noiseless belt roller mill, purchased recently from Messrs. Edw. P. Allis & Co., Milwaukee, Wis.

The Geo. T. Smith M. P. Co., are in receipt of an order from the Great Western Mfg. Co. for one No. 1 Martin centrifugal reel and one No. 3 purifier.

J. M. Yenson & Co., of Lowell, Neb., have given their order for one No. 1 Geo. T. Smith middlings purifier, through the Great Western Mfg. Co.

B. F. Gump, of Chicago, Ill., calls for another Stevens roller mill, and the Jno. T. Noye Mfg Co., of Buffalo, N. Y., will see that the call is answered.

The Case Mfg Co., Columbus, O., are furnishing the Model Roller Mills Co., North Middletown, Ky., with a line of purifiers and centrifugal reels.

The Geo. T. Smith M. P. Co. have an order from Smith, Hill & Co., of Quincy, Ill., to ship one of their No. 0 purifiers to Zeigler & Co., Shelbina, Mo.

On July 26th, the Geo. T. Smith M. P. Co., shipped twelve No. 0 purifiers and four No. 1 purifiers to Messrs. Wm. R. Dell & Son, London, England.

The Geo. T. Smith, M. P. Co. have received orders for two No. 00 purifiers to be shipped to the Eagle Mill Co., St. Joseph, Mo. From Sam Kaucher.

The Iowa Elevator Co., Peoria, Ill., lately ordered an 18x48 Reynolds Corliss engine from the Reliance Work of Edw. P. Allis & Co., Milwaukee, Wis.

The Case Mfg Co., Columbus, O., furnished H. G. Hartwell, Irving Mills, Wis., with one Case purifier, which he says, "beats all the purifiers he ever saw."

The Geo. T. Smith M. P. Co. have recently shipped one No. 3 purifier to O. J. True & Co., Port Clinton, O. on the order of Barney & Kilby, of Sandusky, O.

F. A. Howland, of Lambton Mills, Ont., has ordered of the Jno. T. Noye Mfg Co., of Buffalo, N. Y., a single roller mill with Stevens patented corrugations.

The Geo. T. Smith M. P. Co., have shipped one No. 3 centrifugal reel to H. C. Sherman, Moltville, N. Y., on the order of Chas. Rakes, Esq., Lockport, N. Y.

The Geo. T. Smith M. P. Co., have received orders from the Heywood-Nivins Mill Co., of Constantinople, Turkey, for two of their No. 6 middlings purifiers.

Case Mfg Co., Columbus, O., have an order from J. N. Stull, Veedersburg, Ind., for two pairs of rolls with automatic feed, and one Case centrifugal reel.

S. F. McDonald, Oxford Mills, Iowa, has remodled his mill, and put in the Case system of gradual reduction. He expects to be in operation in a few days.

The Sunflower Oil Mill, at Clarksdale, Miss., is putting in a 14x42 Reynolds Corliss engine, purchased from Messrs. Edw. P. Allis & Co., Milwaukee, Wis.

The Geo. T. Smith M. P. Co. have recently filled an order for four No. 0 purifiers from Messrs. R. G. Shuler & Co., for Slaughter & Lindsay, Fullerton, Neb.

The Geo. T. Smith M. P. Co., have recently received an order from B. F. Gump, of Chicago, Ill., for two No. 0 purifiers and one No. 3 Martin centrifugal reel.

Edw. P. Allis & Co., of the Reliance Works, Milwaukee, Wis., have recently sold Messrs Gardner & Seymour, Fulton, N. Y., a Gray's noiseless belt roller mill.

The Geo. T. Smith M. P. Co., have supplied Eisenmayer & Co., of Halstead, Kas., with one No. 2 Martin centrifugal reel, on the order of Messrs. Ladd & Gehman.

The Geo. T. Smith M. P. Co., have lately shipped one of their No. 0 Martin centrifugal reels to M. M. Wright, Danville, Ill., on the order of the Hutchinson Mfg. Co.

The Case Mfg Co., Columbus, O., have an order from A. J. Meiklejahn, Little Wolf, Wis., for two pair rolls with patent automatic feed, and one Case centrifugal reel.

C. T. Dodge, Lapier, Mich., has ordered of the Jno. T. Noye Mfg Co., Buffalo, N. Y., a double roller mill with Stevens patented corrugations, for grinding middlings.

F. L. Ellis & Co., of Hopkinsville, Ky., has planted an order with the Jno. T. Noye Mfg Co., of Buffalo, N. Y., for a single Stevens Roller mill for grinding middlings.

Marshall, Kennedy & Co., of Pittsburgh, Pa., have ordered of the Jno. T. Noye Mfg Co., Buffalo, N. Y., a double roller mill with Stevens patented corrugations.

John Walterhouse, of Vincennes, Ind., representing the Jno. T. Noye Mfg Co., of Buffalo, N. Y., has ordered a double Stevens roller mill for Major Collins, at Brazil, Ind.

F. J. & J. W. Schupp, Concordia, Mo., recently placed an order with Messrs. Allis & Co., Milwaukee, Wis., for a Gray's noiseless belt roller mill for one of their customers.

The Geo. T. Smith M. P. Co., have received orders from Messrs. A. Root & Co., Hersey, Mich., for one No. 3 Smith purifier and one No. 1 and one No. 4 Martin centrifugal reels.

Baggett & Greathouse, Temple, Tex., are operating their mill on the gradual reduction system, using breaks, rolls, purifiers, etc., furnished by the Case Mfg Co., Columbus, Ohio.

Joseph Schmick, Blue Earth City, Minn., is improving his mill and putting in a No. 2 four break reduction machine, ordered of Messrs. Edw. P. Allis & Co., Milwaukee, Wis.

The saw, grist and starch mills, owned by J. L. Ripley & Co., also the paint and repair shops owned by Mr. Ripley in Anver, were burned recently. Loss about $6,000; no insurance.

M. B. Sheffield, Fairbault, Minn., lately ordered an 18x36 Reynolds' new style engine, from Messrs. Edw. P. Allis & Co., Milwaukee, Wis., to run his flouring mill at that place.

Chas. Huber, the Hungarian expert, of St. Louis, Mo., has instructed the Jno. T. Noye Mfg Co., of Buffalo, N. Y., to ship Cowgill & Hill, of Carthage, Mo., five Stevens double mills.

Jno. Webster, the veteran millwright of Detroit, Mich., has ordered a double Stevens roller mill of the Jno. T. Noye Mfg Co., of Buffalo, N. Y., for W. J. Green, Waterford, Mich.

The Geo. T. Smith M. P. Co., are in receipt of an order from the Slater Mill Co., of Blanchester, O., for one No. 3 and one No. 8 purifiers, to be shipped Wm. L. Oliver, Camp Point, Ills.

The Geo. T. Smith M. P. Co., are in receipt of an orde from Mr. A. R. Ennis, to ship one No. 4 Martin centrifugal and No. 0 purifier to the Bolckow Milling Co., of Bolckow, Mo.

E. D. Munger is building a mill at Kilbourn City. It will have a capacity of about 75 bbls. per day. He will use 4 16-inch water-wheels manufactured by G. M. Marshall & Sons, of Kilbourn City.

Edw P. Allis & Co., of the Reliance Works, Milwaukee, Wis., have furnished Messrs. Fitzsimmons & Kreider, recently, with a Gray's noiseless belt roller mill for their mill at Jacksonville, Ill.

Patterson & Donleavey, New Philadelphia, Ohio, have about completed the remodeling of their mill, putting in the Case system of gradual reduction. They expect to be running in a few days.

The Geo. T. Smith M. P. Co. have received orders from the Noye Mfg Co. for two No. 0 purifiers, from G. W. M. Keller; and one No. 1 and one No. 2 purifiers for C. Lowndsburry, Oswego, N. Y.

The Eagle Mill Co., St. Joseph, Mo., are remodeling their mill and have placed an order with Messrs. Edw. P. Allis & Co., Milwaukee, Wis., for five pairs Allis rolls, in Gray's noiseless belt frames.

Berraiz Bros., of Ft. Atkinson, Ia., have ordered of the Jno. T. Noye Mfg Co., Buffalo, N. Y., a five break concentrated roller mill, with Stevens patented corrugations. F. R. Fletcher took the order.

Donahue & Hennebery, of Chicago, Ill., recently contracted with Messrs. Wardell & Hinckly, of Chicago, for a 14x36 Reynolds Corliss engine, made by Messrs. Edw. P Allis & Co., Milwaukee, Wis.

W. R. Dell & Son, of London, Eng., have cabled the Jno. T. Noye Mfg Co., of Buffalo, N. Y., to ship them a concentrated roller mill, and write that the mill is having great success in that country.

G. M Cresswell, Petersburg, Pa., has deposited an order with the Jno. T. Noye Mfg Co., Buffalo, N. Y., for a Rounds sectional roller mill and single mill, all with Stevens patented corrugations.

Edw. P. Allis & Co., Milwaukee, Wis., are furnishing the machinery for refitting the mill of Thos. Jones & Son, Columbus, O., and have shipped a porcelain roller mill, purifiers, centrifugal reels, etc.

The Haxtun Steam Heating Co., of Kewaunee, Ill., recently placed orders with Messrs. Edw. P. Allis & Co., of the Reliance Works, Milwaukee, Wis., for a 16x42 and 14x36 Reynolds Corliss engine.

Eastman, Laird & Co., Washua, Iowa, have ordered of the Jno. T. Noye Mfg Co., Buffalo, N. Y., a Rounds four break sectional roller mill and a single mill, all with Stevens patented corrugations.

A Dehner & Co., of St. Louis, Mo., recently placed an order with Messrs. Edw. P. Allis & Co., of the Reliance Works, Milwaukee, Wis., for a 14x36 Reynolds Corliss engine for parties at Seneca, Mo.

Edw. P. Allis & Co., Milwaukee, Wis., recently received an order through Messrs. Pond Engineering Co., of St. Louis, for a 16x42 Reynolds Corliss Engine, for Messrs. H. B. Eggars & Co., of same place.

The Case Mfg Co., Columbus, O., have furnished the C. A. Gambrill Mfg Co., Baltimore, Md., with twenty-two of their automatic feed boxes, to be used on as many different purifiers of other manufacture.

Edw. P. Allis & Co., Milwaukee, Wis., have secured the contract for remodeling the mill of Gilbert & Bro., at Fulton, N. Y., and will furnish a full line of Gray's noiseless belt roller mills, purifiers, etc.

Shuler & Co., of Minneapolis, Minn., have the contract for building a mill for A. G. Seeney, Sioux Falls, D. T., and have ordered four Stevens roller mills of the Jno. T. Noye Mfg Co., of Buffalo, N. Y.

Wm. F. Piel & Co., have recently ordered a 26x60 Reynolds Corliss engine from Messrs. Edw. P. Allis & Co., of the Reliance Works, Milwaukee, Wis., for their extensive starch works at Indianapolis, Ind

The Plano Mf'g Co., of Plano, Ill., have placed their order with Messrs. Edw. P. Allis & Co., of the Reliance Works, Milwaukee, Wis., for a 26x48 Reynolds Corliss engine, to drive their works at that place.

The Case Mfg Co., Columbus, Ohio, are furnishing Benjamin Noble, Aberdeen, Md., with two pair rolls with automatic feed, and one "Little Giant" break machine with scalping reel making three separations.

The Geo. T. Smith M. P. Co., have recently supplied G. W. Clark, Fairport, N. Y., with two No. 0 purifiers, and E. A. Van Arddall, of Ontario, N. Y., with three No. 0 purifiers on the order of the Jno. T. Noye Mfg. Co.

The Case M'fg. Co., Columbus, O., have just shipped R. W. Mehard of East Brook, Pa., 1 Little Giant break machine making 3 separations, to go in the mill he is remodeling for Swogger Bro's, Nesahasmack Falls, Pa.

L. A. Funk, Sigourney, Ia., has lodged an order with the Jno. T. Noye Mfg Co., of Buffalo, N. Y., for a three break Rounds sectional roller mill, and a double mill for bran and tailings, all with Stevens corrugations.

J. M. Cole's 250-barrel roller mill at Rochester, Minn., was destroyed by a tornado, Aug. 21st, and Mr. Cole was killed. A large portion of the city of Rochester was laid in ruins; and 24 persons killed and many wounded.

The Geo. T. Smith M. P. Co., have recently received orders from the Nordyke & Marmon Co., of Indianapolis, Ind., as follows: One No. 3, two No. 2 and one No. 1 double and ten No. 0 Geo. T. Smith middlings purifiers.

F. R. Fletcher, the veteran millwright, of Decorah, Ia., has lodged an order with the Jno. T. Noye Mfg Co., of Buffalo, N. Y., for a Rounds four break roller mill with Stevens patented corrugations, for Bell Bros., Osage, Ia.

The Wamego Milling Co., of Wamego, Kas., have placed an order with Messrs. Edw. P. Allis & Co., for the entire machinery to run their mill on the full roller system, including a 24x42 Reynolds Corliss engine to drive same.

J. C. Painter, of Osceola, Ia., has ordered of the Jno. T. Noye Mfg. Co., of Buffalo, N. Y., a five break concentrated, and a single mill, all with the Stevens corrugations. F. R. Fletcher, the popular millwright, captured the order.

The Slater Mill Co., Beauchester, Ohio, recently secured an order from H. M. Oliver, Camp Point, Ill., for a Gray's noiseless belt roller mill, which was promptly sent to Messrs. Edw. P. Allis & Co., Milwaukee, Wis., to be filled.

O. H. Hastings & Co., of Oswego, N. Y., have deposited an order with the Jno. T. Noye Mfg Co., of Buffalo, N. Y., for five Stevens double roller mills, as well as other mill machinery required to convert the mill to the roller system.

The Geo. T. Smith M. P. Co., are in receipt of an order from the Springfield Foundry and Machine Co., of Springfield, Mo., to ship one No. 2 purifier and one No. 1 Marti centrifugal reel to the Queen City Milling Co., of Springfield.

Replogle & Brown, Farragut, Ia., recently placed an order with Messrs. Edw. P. Allis & Co., Milwaukee, Wis., for a No. 2 four break machine, Gray's noiseless roller mills, centrifugal reels, etc., to remodel their mill to the roller system.

G. G. Dutton, Chester, Pa., is making extensive improvements in his mill and adding a No. 2 four break reduction machine and Gray's noiseless belt roller mill, purchased from Messrs. Allis & Co., Reliance Works, Milwaukee, Wis.

Mr. Jas. K. Scribner, Eldorado, Wis., is adding another Gray's noiseless belt roller mill, centrifugal reel, etc., to his mill at Eldorado, and when completed will be prepared to compete with the other roller mills in that section successfully.

J. D. Edge, of Minneapolis, Minn., reports considerable business in that section, and recently placed an order with Messrs. Edw. P. Allis & Co., Milwaukee, Wis., for a Gray's noiseless belt roller mill, for A. D. Ellsworth, Minnesota City, Minn.

Smith & Daley, Sturgeon Bay, Wis., have ordered a 14x36 Reynolds Corliss engine of Messrs. Edw. P. Allis & Co., Milwaukee, Wis., to drive their flour mill at that place, they also ordered the machinery for their mill of Messrs. Allis & Co.

E. W. Pride, of Neenah, Wis., has forwarded an order to the John T. Noye Mfg Co. of Buffalo, N. Y., for a four break Rounds sectional roller mill, and a single mill with Stevens patent corrugations to go in the mill of G. F. Dawley, Royalton, Wis.

Edw. P. Allis & Co., Milwaukee, Wis., recently shipped Messrs. Munro & Neyhart, Auburn, N. Y., a Wegmann's porcelain roller mill, an 8' centrifugal reel, etc. Same was ordered through Mr. James Miller, the popular salesman for Messrs. Allis & Co.

The Case Mfg Co., Columbus, O., have been awarded the contract of John Whrich, Gratis, Preble Co., O. for a full gradual reduction mill on the Case system, using eight pair Case rolls in connection with their breaks, purifiers, centrifugals, scalpers, etc.

The Brinkley Oil Co., of Brinkley, Ark., will put in a 18x48 Reynolds Corliss engine, and has placed an order to that effect with Messrs. Edw. P. Allis & Co., of Milwaukee, Wis. This makes several of these engines sold for oil mills the past month. 'Tis well.

Horn & Dill, Gahanna, Ohio, have contracted with Messrs. Edw. P. Allis & Co., Milwaukee, Wis., for the entire outfit for remodeling their mill to the roller system and will use eight pair of Allis rolls in Gray's noiseless belt frames, centrifugal reels, purifiers, etc.

W. G. Gage & Co., Fulton, N. Y., are enlarging the capacity of their mill and have placed contract with Messrs. Edw. P. Allis & Co., Milwaukee, Wis., for nine pair of the celebrated Allis rolls, purifiers, centrifugal reels, and other machinery used in the change.

The contract for overhauling the mill of Herrick & Son, at Watertown, N. Y., has been let to the Jno. T. Noye Mfg Co., Buffalo, N. Y., who, besides other machinery required, will furnish a five break concentrated mill and three double mills, all with Stevens corrugations.

D. Scott of Macomb, Ill., is so well pleased with his North mill recently remodeled by Stout, Mills & Temple of Dayton O., that he has given them an order to remodel his other mill near the Square in Macomb. They will use the Gilbert combined and Livingston mills, as in the first.

Kanute & Burts, Flintville, Wis., recently placed orders with Messrs. Edw. P. Allis & Co., Milwaukee, Wis., for an outfit of Allis rolls in Gray's noiseless belt frames, a No. 2 four break reduction machine, centrifugal reels, etc., making their mill on the roller system, when completed.

Shuler & Co., the well established mill builders of Minneapolis, Minn., have instructed the Jno. T. Noye Mfg Co., of Buffalo, N. Y., to ship them a four break Rounds sectional roller mill, and a double mill for bran and middlings, to Dassal, Minn., where they are building a mill.

Ford & Charbin, Harmony, Ind., have contracted with Messrs. Edw. P. Allis & Co., Milwaukee, Wis., for the necessary machinery to change their mill to the roller system, which will consist of six pair of the celebrated Allis rolls, in Gray's noiseless belt frames, centrifugal reels, etc.

Richards & Butler, Indianapolis, Ind., are remodeling Messrs. Elliott, Messick & Co's. mill at Shelbyville, Ind., and are using six pair of the celebrated Allis rolls, in Gray's noiseless belt frames. They have also ordered six pair in Gray's noiseless belt frames, for another job which they have under consideration in Ind.

H. Schnebley & Co., Dartford, Wis., are remodeling their mill to the roller system, and have contracted with Messrs. Edw. P. Allis & Co., Milwaukee, Wis., for the complete outfit, including six pair of the celebrated Allis rolls and two pair of Wegmann's porcelain rolls, in Gray's noiseless belt frames, centrifugal reels, purifiers, etc.

Hush & Pritchard, Indianola, Iowa, are remodeling their mill and have recently placed their order with Messrs. Edw. P. Allis & Co., Milwaukee, Wis., for a No. 2 four break reduction machine, two double, "style B," machines, purifiers, etc. Messrs. Allis & Co. will soon be prepared to fill all orders promptly for these new "style B." machines.

The Wamego Milling Co., Wamego, Kansas, have awarded contract to Messrs. Edw. P. Allis & Co., of the Reliance Works, Milwaukee, Wis., for the erection of a complete mill, with a capacity of 150 bbls. in 24 hours. Messrs. Allis & Co. furnish everything, including a full line of the celebrated Allis rolls, in Gray's noiseless belt frames, and a 14x42 Reynolds Corliss engine, to furnish power for the mill.

F. W. Kickbush, Wausau, Wis., is remodeling his mill and has placed contract with Messrs. Edw. P. Allis & Co., of the Reliance Works, Milwaukee, Wis., for the entire outfit, including fourteen pair of the celebrated Allis rolls, in Gray's noiseless belt frames. The mill will be driven by a Reynolds Corliss engine, also purchased from Messrs. Allis & Co.

The Geo. T. Smith M. P. Co. are in receipt of the following orders from the Stilwell & Bierce Mfg Co., of Dayton, O.: Two No. 0 purifiers and one No. 2 Martin centrifugal reel, to be shipped to S. M. Greely, Foster's Crossing, O.; five No. 00 purifiers to be shipped to themselves at Dayton, O., and three No. 0 purifiers to be shipped to Amos Phelps, Delavan, Wis.

The Stilwell & Bierce Mfg Co. have shipped two pair of 9x18 rolls to Scott & Williams, St. Louis, Mo.

Hardesty Bro's, Canal, Dover, O., have recently placed their order with the Stilwell & Bierce M'fg Co. for the Odell rolls.

The Stilwell & Bierce Mfg Co. have recent orders from the Richmond City Mill Works for twenty pair of Odell roller mills.

Four pairs of Odell rolls have been ordered from the Stilwell & Bierce M'fg Co., for the mill of C. Dobson & Son, Cheryvale, Kan.

Fathias, Hous & Frazen, Marytown, Wis., have ordered four pair of Odell rolls for their new mill, which they are thoroughly overhauling.

Odell rolls have been ordered by McMahan Bro's, Burlington, Kan. They have also placed orders with the Stilwell & Bierce M'fg Co. for other mill machinery.

The mill which is to be built at Richmond, Ind., by the Richmond City Mill Works, and which is to be the model mill of the State, will use fourteen pair of the celebrated Odell rolls.

C. & W. Beeber, Clarkstown, Pa., have instructed the Jno. T. Noye Mfg Co., Buffalo, N. Y., to ship them a Rounds sectional roller mill, all with Stevens patented corrugations.

D. Kunkle & Son, Oregon, Mo., have placed their order with the Stilwell & Bierce Mfg Co., of Dayton, O., for four pair of Odell rolls and other machinery. They also furnish the diagram.

Jno. Webster, of Detroit, Mich., has planted an order with the Jno. T. Noye Mfg Co., Buffalo, N. Y., for three double roller mills with Stevens corrugations, for A. N. Hart, Lansing, Mich.

Chas. Huber, the St. Louis, Mo., milling engineer, has ordered of the Jno. T. Noye Mfg Co., of Buffalo, N. Y., two double roller mills with Stevens corrugations, for A. Dehner & Co., St. Louis, Mo.

J. E. Schoellkopf, of Buffalo, N. Y., has purchased one of the Buffalo Mills at that place, and will improve the same by the addition of two single roller mills with Stevens patented corrugations.

Chas. Huber, St. Louis, Mo., reports trade quite good. He has recently sent in an order to the Jno. T. Noye Mfg Co., Buffalo, N. Y., for two double Stevens roller mills for H. B. Eggers & Co., St. Louis, Mo.

Three pairs smooth rolls with patent automatic feed, one three-roll break machine and one No. 1 double purifier have been ordered from the Case M'fg Co., Columbus, O., for J. H. Dearborn, Silver Lake, Kans.

Courtney Wood, Kiousville, O., put in a Case purifier a short time ago, and writes as follows: "The purifier is working well and has improved the flour 25 per cent. or more in quality, and also in quantity."

The mill of T. J. Bloom, New Madison, O., is to be remodeled to the Odell system by the Stillwell & Bierce Mfg Co., Dayton, O. They will use twelve pair of the Odell rolls; they also furnish all the machinery.

The Stilwell & Bierce M'fg Co. have an order from C. F. Dumke & Co., New Holstein, Wis., for 10 pairs of Odell rolls, and are to furnish plans and system for their mill, which is to be changed at once to a full roller mill.

Raymond Mill Co., of Osceola, Iowa, have ordered a concentrated roller mill with Stevens patented corrugations of the Jno. T. Noye Mfg Co., Buffalo, N. Y. F. B. Fletcher, the stalwart millwright, captured the order.

The Stilwell & Bierce M'fg Co. have a recent order from Reblitz Bro's, Chilton, Wis., for a pair of Odell rolls for their mill which is to be remodeled at once. They also furnish them plans and programme on the Odell system.

Crouch Bros., of Erie, Pa., have determined to put rollers into their mill, and for that purpose have directed the Jno. T. Noye Mfg Co,, of Buffalo, N. Y., to ship them eleven pairs of rolls with the Stevens patent corrugations.

Mrs. Dortha Gerlach, North Amherst, O., has placed an order with the Case M'fg Co., Columbus, O., for 1 Little Giant break machine and scalper combined, making 3 separations and 2 pairs Case rolls with patent automatic feed.

The Stilwell & Bierce Mfg Co., have orders from C. F. Espenhain, Lyons, N. Y., for eight pair of Odell rolls; also for a water wheel. Their mill is to be changed over without delay, according to plans furnished them by Mr. Odell.

The Case M'fg Co. of Columbus, O., have been awarded the contract of J. Terry & Co., Amanda, O., for a full gradual reduction mill on the Case system, using 8 pairs of rolls in connection with their breaks, purifiers, centrifugals, scalpers &c.

E. W. Pride, the Neenah, Wis., agent for the Jno. T. Noye Mfg Co., Buffalo, N. Y., ordered two single roller mills and Rounds three break sectional roller mill, with Stevens patented corrugations, for the mill of J. H. Dunham, at Juneau, Wis.

Northrup Bros., Wyandott, Kans, put in 2 pairs Case rolls some time ago, and they are so well pleased with them that they have now placed their order with the Case M'fg Co., Columbus, O., for a line of breaks, rolls, centrifugals, scalpers, &c., for a full gradual reduction mill on the Case system,

The Case M'fg Co., Columbus, O., have received an order from Randall, Rankin & Co, Leetonia, O., for 1 Little Giant break and scalper combined, and 3 pairs smooth rolls with patent automatic feed. This firm have been running some of the Case rolls for some time past with the best of satisfaction.

The Stilwell & Bierce Mfg Co. have just secured the order to remodel the Eufaula Mills, Eufaula, Ala., to the Odell system. This mill is now one of the finest in the State, and when finished will have no equal in the South. Twenty pair of Odell rolls will be used. The milling diagram will be furnished by Mr. U. H. Odell.

The Case M'fg Co., Columbus O., have been awarded the contract of Frederick Placier, London, O., for a full gradual reduction mill on the Case system, using 8 pairs of rolls in connection with breaks, purifiers, scalpers &c. Mr. Placier, is one of the foremost millers in Central Ohio, and carefully investigated the different systems before placing his order.

The Bass Foundry and Machine Works, Ft. Wayne, Ind., are remodeling a number of mills to the roller system, among which are the following: Shirk & Friend, Tipton, Ind., putting in a Gray's noiseless roller mill; Union Mills Flour Co., Van Wert, O., one Gray's noiseless belt roller mill; orders for these machines being placed with Messrs. Edw. P. Allis & Co., of the Reliance Works, Milwaukee, Wis.

Chisholm Bros. & Gunn, Minneapolis, Minn., are changing the mill of Messrs. Lee & Herrick, at Crookston, Minn., to the roller system, and will use fourteen pair of Allis rolls, in Gray's noiseless belt frames, order for which has been placed with Messrs. Allis & Co. They are also remodeling a mill at Denver, Col., in which they are using thirty-six pair of Allis rolls, all in Gray's noiseless belt frames.

Clyde Mill Co., Clyde, Kas., one Gray's noiseless belt roller mill; Arkansas City W. P. Co., Arkansas City, Kas., twelve pair of Gray's noiseless frames, with Allis rolls.

The Richmond City Mill Works, of Richmond, Ind., have recently placed orders with Messrs. Edw. P. Allis & Co., of the Reliance Works, as follows: V. M. Ayers, Arkansas City, Kas., one Gray's noiseless belt roller mill.

The Geo. T. Smith M. P. Co., have supplied the following named machines on the order of the Great Western Mfg Co., of Leavenworth, Kansas: one No. 00 purifier to David Close, Norton, Kan., one No. 1 Martin centrifugal reel to Kelley & Liske, of Leavenworth, Kan., and one No. 2 purifier to Peerless Mill Co., Council Grove, Kas.

The Geo. T. Smith M. P. Co., have recently received orders from the Gratiot Mfg. Co., as follows: two No. 1 purifiers to be shipped to Geo. Ingersoll, Marshall, Mich., one No. 4 Martin centrifugal reel to be shipped to W. H. Herry, Celina, O., one No. 1 purifier to be shipped to J. H. Plain & Co., North Aurora, Ills., and one No. 1 purifier to be shipped Aylsworth & Co., Fostoria, O.

The Geo. T. Smith M. P. Co., have recently supplied H. Schemebly & Co., of Dartford, Wis., with one No. 2 double purifier. The Nashville Mill Co., of Nashville, Tenn., with three No. 1 and three No. 0 purifiers. Thos. Jones & Co., of Columbus, O., one No. 2 purifier to replace a Case purifier, and two No. 2, one No. 1 and one No. 00 purifiers for Wm. G. Gage & Co., Fulton, N. Y. All the above on order of Messrs. E. P. Allis & Co., of Milwaukee, Wis.

The following are amongst recent orders received by the Geo. T. Smith M. P. Co. from I. Q. Halteman & Co., St. Louis, Mo.: One No. 3 purifier, to be shipped to S. B. Poor & Co., Dongola, Ill.; one No. 2 purifier, and one No. 1 Martin centrifugal to be shipped to themselves, at St. Louis, Mo.; one No. 0 purifier to be shipped as above, and one No. 1 and one No. 2 Martin centrifugal reels, one No. 0, one No. 1 and one No. 2 purifiers to be shipped to St. Louis.

The following are some of the more recent orders received by the Geo. T. Smith M. P. Co from the Simpson & Gault Mfg Co., Cincinnati, O.: One No. 2 Martin centrifugal reel to be shipped to Bush Bros., Proctorville, O.; one No. 0 purifier to be shipped to W. P. Smith, Mt. Juliet, Tenn.; one No. 3 Martin centrifugal reel to be shipped to Rogers & Bostain, Carlisle, Ky., and one No. 3 Martin centrifugal reel to be shipped to Depot Mills Co, Columbia, Tenn.

Edw. P. Allis & Co., of Milwaukee, Wis., recently captured quite an important contract, namely, a pair of pumping engines for the Allegheny City Water Works, Allegheny, Pa. The high pressure cylinders of these engines will be 31x48, and low pressure cylinders 43x48. The engines are guaranteed to pump six million gallons of water 220 feet high every 24 hours. Notwithstanding very low bids by the Holly M'f'g Co. and Quintard Iron Works, Messrs. Allis & Co. were awarded the contract, the committee recognizing the superiority of their engines.

Stout, Mills & Temple of Dayton, O., the old reliable mill-furnishers, have received orders for Gilbert & Livingston mill the past 30 days, as follows: From J. & P. W. Anderson, Bolekow, Mo., 2 pairs of Livingston rolls; A. C. Wilson, Springfield, Mo. 9 pairs of Livingston rolls; J. R. White & Co., Mitchell, D. T., 1 Gilbert combination mill; D. Scott, Macomb, Ill., 1 Gilbert combined mill, 2 double Livingston mills; Cory Flour Mill Co, 7 pairs of Livingston rolls; Bennett & Reas, West Plains, Mo., 1 double Livingston mill; J. M. Bradbury, Bunker Hill, Kas., 1 double Livingston mill; Queen City Milling Co., Springfield, Wis., 3 double Livingston mills; Zoar Society, Zoar, O., 1 double Livingston mill; Pray M'f'g Co, Minneapolis, Minn., 1 car-load—(6 double mills) Livingston rolls.

Some of the recent orders which the Geo. T. Smith M. P. Co., have received from the Jno. T. Noye Mfg. Co., are as follows: one No. 2 purifier, one No. 2 double purifier, one No. 1 and one No. 3 Martin centrifugal reels for D. P. Hamilton, White Pigeon, Mich., two No. 0 purifiers and one No 3 reel to be shipped to Bell & Forster, Mansfield Valley, Pa., one No. 0 purifier for Geo. N. Beach, Brillion, Wis., one No. 1 purifier and one No. 1 Martin centrifugal reel to be shipped to J. H. Defrees, Goshen, Ind., and two No. 0 purifiers to be shipped to Norton & Meyers, Lima, O.

The Geo. T. Smith M. P. Co., are in receipt of orders from the Jno. T. Noye Mfg. Co.; to ship ten No. 1 Martin centrifugal reels, two No. 3 and one No. 2 purifiers, to Lewis Emery, Three Rivers, Mich. These are for the new mill which the Noye Co. are building for Mr. Emery, and in which a complete centrifugal bolting system will be used.

THE EUREKA SMUT AND SEPARATING MACHINE WORKS OF HOWES & EWELL AT SILVER CREEK, N. Y.

[From the *Journal*, of Dunkirk, N. Y.]

The village of Silver Creek is a little paradise of handsome homes and contented people. Passing through any of the streets, one is struck by the uniform elegance and comfort of the residences, the well-kept lawns, the shaded streets, and every evidence of thrift and prosperity. There seems no dwellings for the poor, and Silver Creek must be one of the places where they have them not always with them. If one looks for the causes of all this it is easy to find in the numerous factories which supply the means for the wealth and refinement which is characteristic of the place. And these factories are in the hands of men who appreciate the value of intelligent and contented labor, and endeavor to cultivate a pride in good citizenship. Silver Creek produces no less than a dozen machines which are important to the milling interests, nearly all of which are inventions of Silver Creek mechanics. They are in demand and sold all over the world, and the Ganges and the Nile, the Australian streams, the Holland canals, and England, France and Russia know them as well as our own country millers, among whom they are in universal use. We shall endeavor only at this time to give some idea of the largest and most prominent of these factories, that of the Eureka Smut and Separating Machine Works, owned by Howes & Ewell, and which are model shops in every respect, and worthy of imitation by manufacturers who would know the secret of successfully managing a large force of men, and inspiring them to work in their interests.

Their shop is a handsome brick building 214 feet through all. The old shop, erected in 1873, was 110x44, three stories high and beyond, a foundry. In this space last year a new addition was erected, 44x66 feet, four stories high and a basement, which relieves present necessities, but in the rapid growth of the business will probably not long afford room enough. One notices immediately on entering the neatness of everything, from machine shop to blacksmith shop and foundry and wood-working shops. The tools are all clean and polished, the floors are clear of refuse, and there is a place for everything and everything is in its place. The arrangements for the comfort and convenience of the men are first-class and deserve attention, as so few shops show this care on the part of employers. In the machine shop, a long iron sink contains bright wash-basins under water-faucets, and above a row of clean towels gives good facilities for personal cleanliness. On each floor are closets and toilet rooms, as neat and well arranged as in the best of private houses. The proprietors consider their workmen something more than mere machines to make money out of, and make a common interest with them in the good name of the works. Better and more accurate work and a common pride in their work is the result, and the effect is shown in the many conveniences which have been added to the shops by the men themselves. Many of the tools used adapted to peculiar uses of cheapening the cost of production of the work are the result of their ingenuity. For instance, much work of perforating sheets of steel and brass was required in making the screens and cylinders for brush machines, so Mr. C. A. Lamphier, foreman of the machine shop, invented one that perforates an entire sheet of metal at a time. At present he is perfecting a little machine for cutting the key-slot in pulleys, and he has added many improvements to the milling machinery made there. Stirling had the job of corrugating the steel rolls of the buckwheat shucker, a slow operation on a planer, but he just geared his planer over so it would do the work automatically itself, and more accurately than could be done by hand. Mr. J. B. Martin, foreman of the wood-working department, has added several improvements to the machines made, and indeed the present smut and separating machine has little relation to the original patent, so constantly have improvements been made, almost entirely the result of study and interest of proprietors and men.

Many of the employes have been with the company for eighteen years, learned their trade there, and have grown up with the business. Nearly all own their homes, and the pretty residences of Silver Creek are the outcome of the wages paid at these shops. There are none of the transient class of workmen, but the system pursued has been to encourage permanency of the force. The company under all its changes of partners has kept this in view, and given its men a fair share of its prosperity. Their trade is so extensive, reaching around the whole world, that it is not affected by financial depressions in any one section. During the long panic of 1873, this shop worked full hours and paid its men full wages. This shows the animus of the employers. Workmen everywhere were begging for work, and they could have procured labor at their own figures, but instead, they made no reduction of wages, paid their men almost twice what the same class of labor was getting elsewhere, and kept their old force at old wages. Their business could afford it and they would not enrich themselves at the expense of their employes. They let them share in their exceptional prosperity while all other manufactories were depressed. You couldn't get up a strike in that shop, for the employes have the same interest as the employers.

This concern makes six machines of value to the milling interest, viz: The Eureka Smut Machine and Separator; the Separator, Brush Machine, Magnetic Separator, the Flour Packer, and the Buckwheat Shucker. Of all kinds they have made one thousand since Jan. 1 of this year. The Smut Machine is the original machine, and was the outcome of cleaner processes of manufacturing flour. It is perfect in its way, and small mills often rely on this alone, but as the milling business became more advanced, other machines were also required, and in 1875 a Separator and Brush Machine were also added to further perfect the process of cleaning the grain before it was made into flour. Later, the self-binding reaper was invented, which bound the sheaves as they were cut with wire, and bits of this wire getting into the wheat, caused the invention of the Magnetic Separator, an ingenious little machine, consisting of horse-shoe magnets, protected by an armature. The grain passing this, every bit of metallic substance is securely caught. The latest reaper uses a twine binder, but it is found that the Magnetic Separator is still useful, and the amount of mineral it finds in grain is astonishing. Another machine which is perhaps even more ingenious than the others, is the Flour Packer, which packs flour closely into the barrels, putting in about four times as much as in the ordinary process of simply filling the barrel and heading it up, and so reducing the cost of shipping. Besides this, there is Cranson's Buckwheat Shucker, which has revolutionized the manufacture of buckwheat flour, and made it more healthful and palatable. Formerly, shuck and all was ground into the flour, but this leaves only the true kernel of wheat, and disposes of the hard shuck, which was the principal source of cutaneous diseases by lovers of the itch-provoking buckwheat cake.

"Our foreign trade," says Mr. Howes, "is increasing rapidly, and is now a large part of our business. We have an agent at London who is busy all the time. We are sending machines to Scotland, England, Wales, Sweden, Denmark, a large amount to the Black Sea country, Austria and Russia. The South of France makes a particularly large demand. Italy is a good customer, and a large trade is being developed in Algeria and the north of Africa. The old Bible countries, which the Scriptures give accounts of particularly primitive milling facilities, are large wheat countries, and improved mills are being constructed through the Valley of the Nile. Australia is another excellent customer, and the South American countries have long been supplied by us. To say nothing of the universal demand in this country, from Maine to California, orders from the latter state being exceptionally large. Our foreign business alone would keep an ordinary shop busy." The visitor is particularly struck by this in the shipping department. Boxed machines are constantly passing out, and a good force is employed in simply packing and shipping.

Another branch of the business is making up bolting cloth for millers' use. This is under charge of Mrs. Fairchild. Several double-needle sewing machines, run by steam power, are employed in this, and the seams are laid smooth and strong by the process. Bolting cloth is of pure silk. It is nearly all made in Switzerland, being woven by hand by the peasantry of that country. It is of different sizes of mesh, the finest being beautiful in its pearly sheen, and but for its great expense, would be coveted by the ladies for their dresses.

A brief history of the business may be of interest. Mr. Simeon Howes, the present senior proprietor, has been connected with it, with few intermissions, from the first, and to him is largely due its unprecedented success, although he has been fortunate in always having associates who were valuable aids. Mr. Howes came to Silver Creek in 1856, and became one of the firm of E. Montgomery & Sons, to whom he had sold the patent of the combined smut and separating machine some years before. In 1857 he sold his interest to his partners, and in 1864 Norman and Alpheus Babcock became interested. In 1865 Mr. Howes became interested with them, radical changes were made in the machine, making the basis of the present Eureka, and under the firm name of Howes, Babcock & Co., the machine obtained a world-wide celebrity. In 1867 Mr. Carlos Ewell became a partner. Recently, Mr. Babcock has retired from the firm, and it is now Howes & Ewell. Every prospect is favorable for the continued growth of the business, and as there are still portions of the world to conquer, the limit is not yet reached. Wherever wheat grows and mills are established, some product of Silver Creek industry will be found.